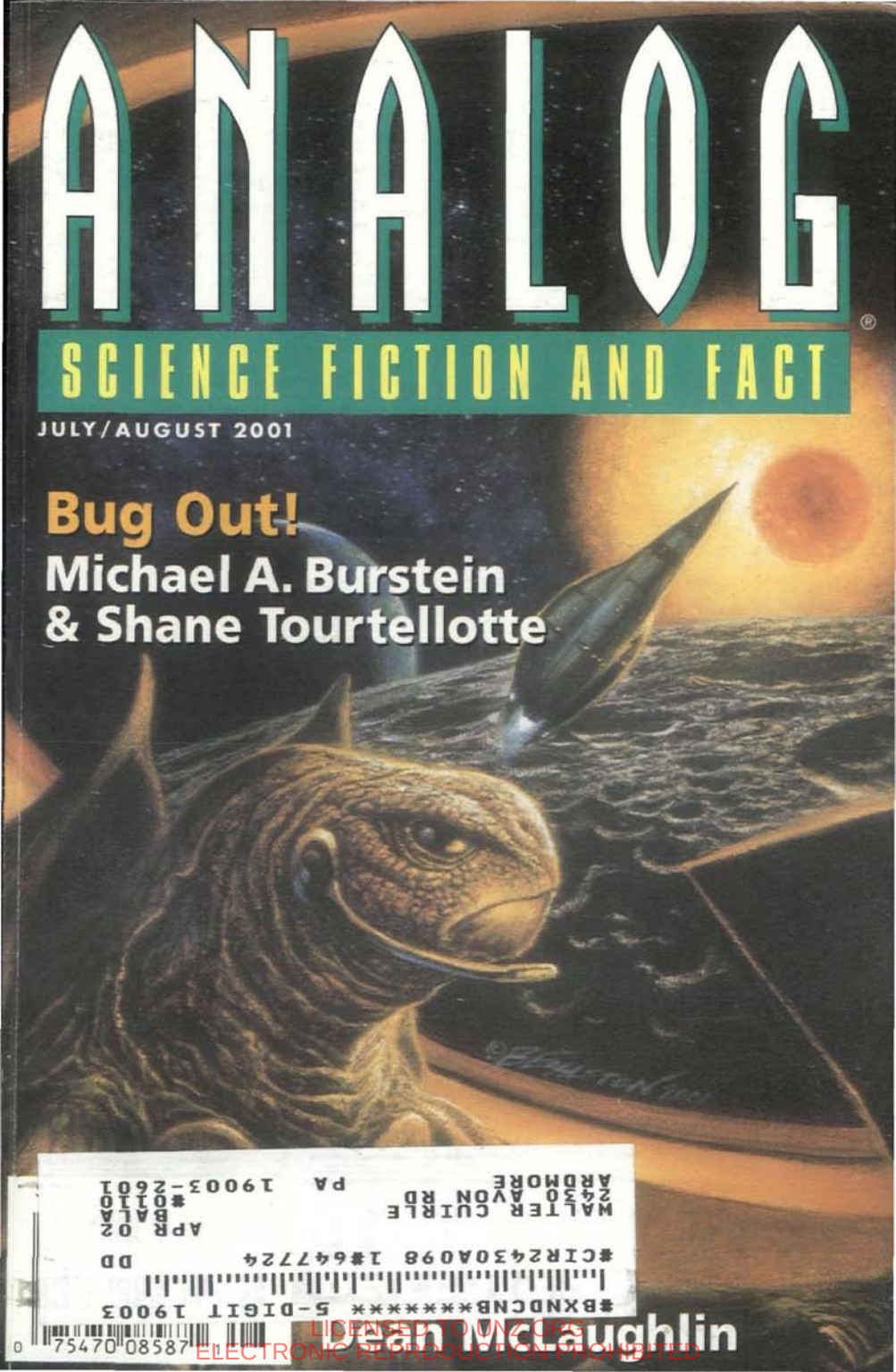
ANALOG

SCIENCE FICTION AND FACT

JULY/AUGUST 2001

Bug Out!

Michael A. Burstein
& Shane Tourtellotte



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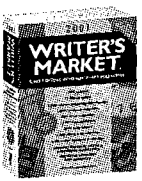

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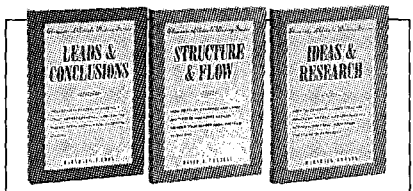

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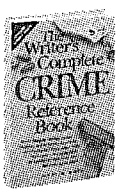

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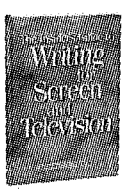

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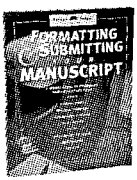

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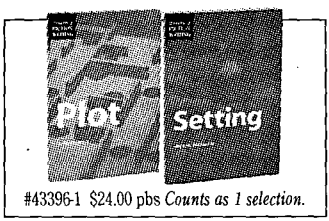

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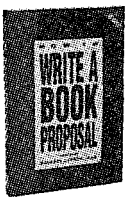

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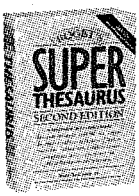

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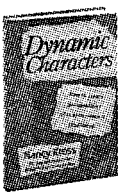

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ANALOG

SCIENCE FICTION AND FACT

Vol. CXXI No. 7 & 8
July/August 2001

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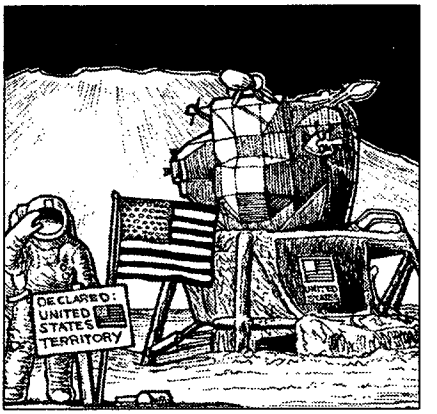

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PIVOTAL EVENTS

This is an "alternate Alternate View."

During the last couple of decades a regular feature of *Analog* has been "The Alternate View," a column of news and commentary about more or less current events in science, technology, and society. Not *too* current, of course; our production lead time, quite different from that of a newspaper or news magazine, makes it too dangerous to focus on the details of today's events *per se*. By the time our comments could see print, the events are likely to have been so overtaken by subsequent events that anything we say about them might no longer be relevant. But quite often the columnists can use a current event as an example of a more general principle or trend, and as a starting point for discussion of where that trend might lead or how it might be altered.

The column's name, to refresh your memory or to explain it to readers who've come on board recently, has two different meanings. One is that it alternates between two regular columnists (currently John G. Cramer and Jeffery D. Kooistra). The other is that it provides space for someone other than the editor to present an alternative viewpoint. That might mean a report on current research and speculation about its future significance from somebody actively involved in it or otherwise close to it. Or it might mean an opinion—on just about anything—different from one expressed by the popular media, *Analog*'s own editor, or the other "Alternate View" columnist. One of our original hopes for the column was that the columnists might sometimes argue with each other, looking at the same problem from two points of view. That has occasionally happened, though more often they've tended to report or comment on different subjects (which is fine, too).

Today I'd like to turn the process around a bit and offer my own alternative view to one recently expressed by an Alternate View columnist. Last month my esteemed colleague Jeffery D. Kooistra gave us some thoughts on "History in the Making." His central point was that significant events—the kinds of turning points that play a crucial role in shaping the future life of an individual or society—are often hard to recognize while they're happening. So if you're lucky enough to recognize that you are seeing such an event, you should pay especially close attention and try to understand what happens during it. The specific example he offered of such an event was last year's U.S. presidential election, which he predicted would "long be considered the most significant thing that happened in the year 2000."

I couldn't agree more with the basic observation, that it's hard to tell which are the truly significant events while they're happening. In fact, I think that's even truer than Jeff let on. In general, you can't be sure whether an event will ultimately turn out to have important long-term consequence until you see what its consequences are—which may

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take years to become apparent. Sometimes an event that looks epoch-making at the time turns out to lead essentially nowhere. And sometimes an event that goes virtually unnoticed ultimately turns out to change things radically. It's easy to come up with historic examples of the latter—things like the development of the theory of plate tectonics, which was generally ignored for decades before it revolutionized the entire field of geology. It's harder to come up with examples of the former, since mostly they've already been forgotten, but they're there—things like the announcement that a sizable asteroid is on a collision course with Earth, followed by a later announcement that it isn't after all. My personal life has lots of examples of both, and I suspect yours does, too.

That's why, even though I think Jeff's basic point is very, very true, I'm far less convinced by his example. I can't prove that last year's election *won't* turn out to be the most significant event of the year 2000 (though I find the possibility curiously depressing), but I see no convincing reason to assume that it will. And I can easily imagine that it will ultimately fade into history as a minor historical curiosity of no particular import at all.

Let's consider briefly what kinds of consequences could give this incident the significance that Jeff expects it to have. Which man won? Well, maybe; but at this point I see no strong reason to assume that either will have a profound impact on history, though either could turn out to surprise me. I'm writing this a little later than Jeff, so it now seems safe to say that only George W. Bush will have the opportunity. It's even safer to say that the closeness of the election proves quite clearly that the country *as a whole*—or, more precisely, that subset of it that bothered to vote—had no significant preference for either candidate. Sure, some groups felt very strongly disposed toward one or the other (some groups always feel strongly disposed toward any candidate), but one of the strengths of this country is that such groups cannot easily impose their preferences on everybody else. Overall, I repeat, the country showed no preference, and would probably muddle through the next four years regardless of which man was in the Oval Office. Yes, we wound up with a winner, with a little help from the Supreme Court. But just about any statistician would say—and many did—that this election was really a tie. The vote margin, particularly in the key state of Florida, was smaller than the likely uncertainties in counting—or, in statistician-speak, statistically insignificant.

Therein, I think, lies (as Jeff recognized) a more likely opportunity for the election of 2000 to have important long-range consequences. The shock of having an election so close that it yields no clear winner will scare some people into reexamining the whole electoral process. They will consider—they are already considering—such questions as

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how extremely close races should actually be decided, and whether the whole structure of the present electoral system has outlived its usefulness and needs to be radically revised. The fact that Gore had a (narrow) popular majority and Bush (eventually) an electoral majority has focused more attention on the institution of the electoral college than it has experienced in recent memory. Conceivably that reexamination could even lead to the abolition of the electoral college and the substitution of direct popular vote (relatively easy to institute now, but not necessarily an unmixed blessing, as several *Analog* stories have shown). Or it might lead to the creation of an entirely new system, perhaps unlike anything we've seen yet.

Either of those consequences would indeed give the Bush-Gore election long-range significance. But it's also quite possible that the only real consequence will be months of talk, ultimately leading to no significant change. In that case, we will have had a few months of entertainment, and some political introspection of a kind we need from time to time, and after that things will drift back to business more or less as usual. If that happens—and let me emphasize again that I'm not saying it *will*, because I don't know (and I don't believe anybody else does either)—then this whole brouhaha will prove to have been a mere ripple in the river of political time, more like a pebble dropped in and sinking to the bottom than a huge boulder that permanently diverts the flow.

However . . .

For the purposes of alternate-history fiction, even if nothing profound comes of what may turn out to be an extraordinarily protracted nonevent, the fact remains that something profound *could* come of it. It may or may not turn out to be an *actual* Most Significant Event, in terms of having important long-term consequences in our real world, but I will certainly grant Jeff that it's at least a *potential* Highly Significant Event. That is, even if it doesn't have much real impact on our history, it *could* have had if it had gone differently. And it can still be fun, and sometimes even useful in thinking about how to deal with the real world, to consider such might-have-beens. In fact, for fictional purposes, perhaps the most interesting events are the ones that look unimportant in our universe, but could have had have much more impact. All I'm saying is that we don't *know* which category this one falls in.

continued on page 129

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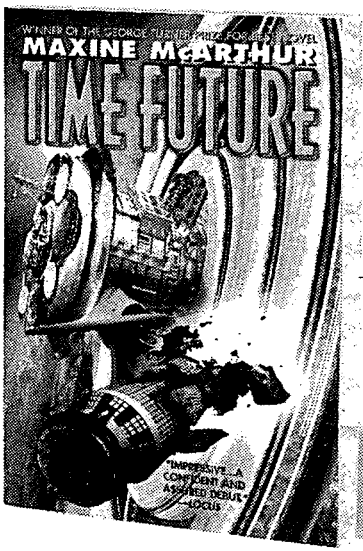

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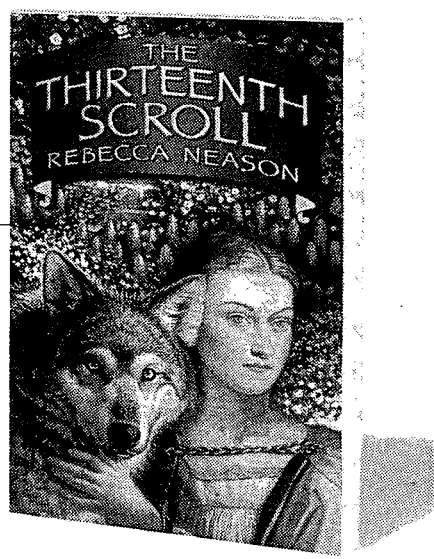

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A DOUBLE LOSS FOR SCIENCE FICTION

The last week of January was an especially sad one for science fiction in general and readers of *Analog* in particular, with the deaths within a few days of both Rick Shelley and Gordon R. Dickson, both well known and admired as writers in many venues including this one. The double loss was particularly poignant for *Analog*'s present editor because of his personal connections with both men, which constitute a good example of how close-knit our field is and how continuity occurs within our "literary family." Gordy was one of my main mentors, astoundingly generous and helpful in the early stages of my own career; Rick was one of the younger writers with whom I tried to "pay it forward."

GORDON R. DICKSON, 1923-2001

Gordon R. Dickson died January 31, 2001, at his home in Minnesota, of complications from the asthma that had plagued him for many years. Born in Edmonton, Alberta, Canada on November 1, 1923, he moved to the United States at the age of 13 and later entered the University of Minnesota. There he studied creative writing with such teachers as Sinclair Lewis and Robert Penn Warren; he also served in the U.S. Army from 1943 to 1946. His first fiction sales were collaborations with Poul Anderson, but soon after his first solo sale in 1951 ("The Friendly Man," to this magazine, then called *Astounding*) he became a full-time writer and remained one for the rest of his life. His output included numerous novels and shorter pieces in a variety of genres, but with a strong emphasis on a unique kind of science fiction. He won numerous Hugo, Nebula, and other awards, and served two terms as president of the Science Fiction Writers of America.

As a writer, he was noted for his perennial concern with the striving of human (and other) life toward something better, and for his meticulous attention to both the grand scope and the details of his art and

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craft. He developed and used the concept of the "consciously thematic novel." Much of his work was part of the Childe Cycle, a projected epic of truly sweeping scope which, had he lived to complete it, would have comprised at least three historical, three contemporary, and eight science fiction novels, spanning a thousand years of human history and evolution. As a man, he was a classic gentleman, known equally for his jovial good nature, his thoughtfulness, and his generosity in sharing with his fans and younger colleagues his many insights about the art, craft, and business aspects of writing.

His family has asked that anyone wishing to make contributions in his memory send them to the SFWA Emergency Medical Fund, 1436 Altamont Avenue, PMB 292, Schenectady, NY 12303-2977.

RICK SHELLEY, 1947-2001

Richard M. Shelley died January 31, 2001, at Vanderbilt University Hospital in Nashville, Tennessee, of liver and kidney complications following a heart attack two weeks earlier during Chattacon. He underwent emergency bypass surgery in Chattanooga after the heart attack and was transferred to Nashville to await a heart transplant, which regrettably did not become available in time.

Born and raised in Kankakee, Illinois, he was a long-time resident of Maryville, Tennessee, and a historian when he broke into fiction in 1985, with a haunting novelette in *Analog*. Many of his subsequent short stories and novelettes appeared here, including such memorable tales as "The Sylph" and "Because It's There." They've been less numerous in recent years because of his growing success as a novelist, beginning with the 1990 fantasy Son of the Hero and continuing through a popular series of military science fiction novels, drawing on Rick's own experience as a veteran.

He is survived by his mother Hazel and several siblings, to all of whom we extend condolences. We will miss both Rick and his work.

Stanley Schmidt

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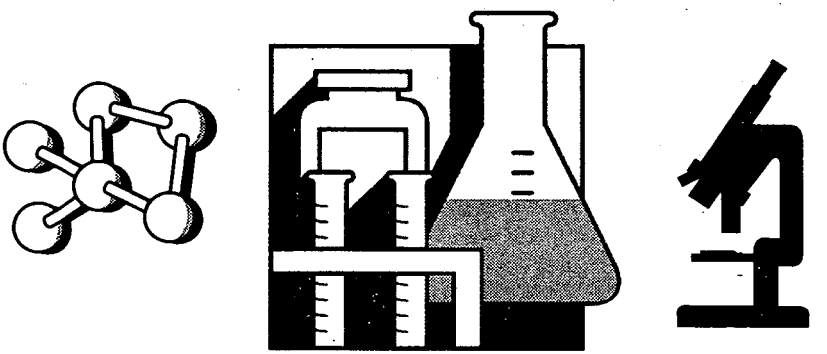

Once again we thank all of you who voted in our annual poll on the previous year's issues. Your votes help your favorite writers and artists by rewarding them directly and concretely for outstanding work. They help *you* by giving us a better feel for what you like and don't like—which helps us know what to offer you in the future.

We have five categories: novellas, novelettes, short stories, fact articles, and covers. In each category, we asked you to list your three favorite items, in descending order of preference. Each first place vote counts as three points, second place two, and third place one. The total number of points for each item is divided by the maximum it *could* have received (if everyone had ranked it #1) and multiplied by 10. The result is the score listed below, on a scale of 0 (nobody voted for it) to 10 (everybody ranked it first). In practice, scores run lower in categories with many entries than in those with only a few. For comparison, the number in parentheses at the head of each category is the score every item would have received had all been equally popular.

NOVELLAS (2.86)

1. "A Roll of the Dice," Catherine Asaro (4.03)
2. "The Retrieval Artist," Kristine Kathryn Rusch (3.43)
3. "Death on Venus," Ben Bova (2.58)
4. "The Ultimate Earth," Jack Williamson (2.49)
5. "Identity Crisis," Kevin J. Anderson (2.19)

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NOVELETTES (0.59)

1. "Stones of Significance," David Brin (1.84)
2. "The Taranth Stone," Ron Collins (1.26)
3. "The Quantum Teleporter," Michael A. Burstein (1.25)
4. (tie) "Debunking the Faith Healer," Michael A. Burstein and Lawrence D. Weinberg (1.05)
   "His Hands Passed Like Clouds," Rajnar Vajra (1.05)

SHORT STORIES (0.48)

1. "Sheena 5," Stephen Baxter (1.83)
2. "Kaddish for the Last Survivor," Michael A. Burstein (1.54)
3. "Night Voices," Stephen L. Burns (1.18)
4. "I Wish You Dead," Brian Plante (1.01)
5. "Any Mother's Son," Maya Kaathryn Bohnhoff (0.91)

FACT ARTICLES (1.67)

1. "Slowboat to the Stars!," Ben Bova (3.02)
2. "Limits to Evolution," Ashley J.R. Carter (2.19)
3. "Interstellar Navigation," John G. Hemry (2.17)
4. "Summer's Lease," J.R. Dunn (2.10)
5. "The Patent Wars," John D. Trudel (1.86)

COVERS (1.82)

1. October (for "The Taranth Stone"): Kelly Freas (3.31)
2. January (for "Under"): Kelly Freas (2.69)
3. May (for "The Debt"): Bob Eggleton (2.34)
4. March (for "Escape Horizon"): Bob Eggleton (2.09)
5. December (for "The Ultimate Earth"): Alan Gutierrez (1.72)

All categories had clear first-place winners this year. Michael A. Burstein wasn't one of them this time, but his name appears in so many other high places as to suggest that he's a victim of what we used to call "the Zahn Effect": a popular author with so many stories competing against each other that none of them comes out quite on top. Ben Bova did well in both fiction and fact categories, and Kelly Freas's capture of the top two cover spots demonstrates yet again his long-famous skill in capturing and going beyond the essence of the story.

We're very pleased that the number of votes was up this year, probably as a result of more readers discovering how easy online voting is. Since Anlab votes are so useful to everyone concerned, we hope to get even more votes next year. Use e-mail or "snail mail," whichever you prefer, but please vote! (And please be careful to vote in the right category, as listed in the annual Index. Every year a few votes are wasted by being cast in the wrong category, and those simply can't be counted. If you didn't use the online voting on our website [*www.analogsf.com*] this year, you might want to try it next time; it makes that problem virtually impossible!)

Andrew J. Breitenbach, of San Jose, CA, is this year's winner of a free one-year subscription in a random drawing from all ballots received. Next year that could be you—and the more votes we have, the more the results mean!

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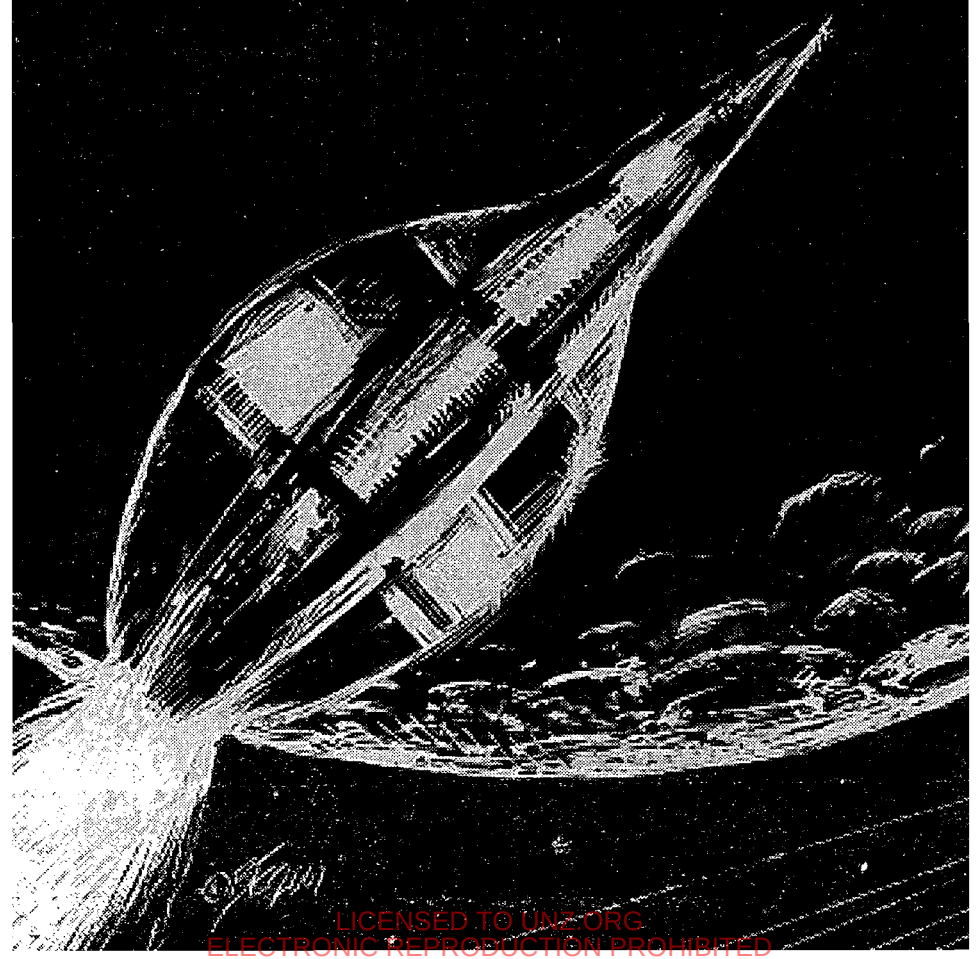
There are two basic, sharply differing approaches to the problem of Contact. But the extremes aren't the only possibilities. . . .

Bug Out!

Michael A. Burstein
and Shane Tourtellotte

Illustration by Bob Eggleton



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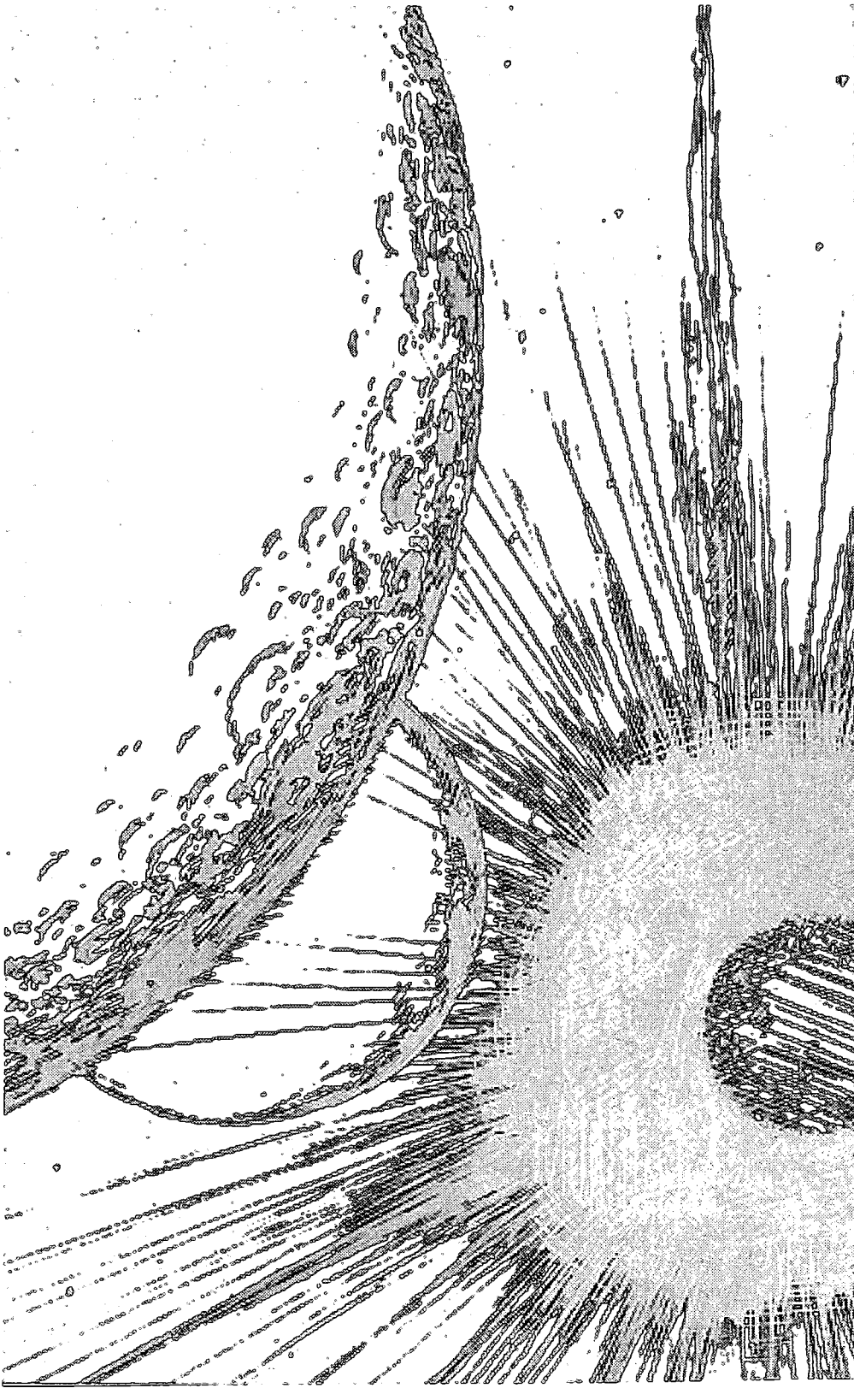

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Phase One

"I've got a launch plume."

Frieda Orr sat in an arc of eight manned stations in the circular monitoring room. The two people on either side of Orr briefly glanced at her, then looked back at their own screens. They were scrutinizing the typically turbulent weather on the planet beneath them.

Julio Escalera, the watch supervisor, remained seated in his position in the middle of the room, behind all eight stations, and continued reading his message pad. "Record it," he said to Orr.

Orr turned to look at Escalera and shook her head; no one else was looking in her direction. "You don't understand, sir," she said. "This launch looks a little different."

Escalera sighed, gently placed his pad on the small table next to him, and walked over to where Orr sat. He was pulling on his mustache, a sure sign of his impatience. Orr turned back around during his approach and kept her eyes on her monitor. Out of the corner of her eye, she could see the two observers next to her exchange a worried glance. She wished they would stop looking up.

Escalera leaned over Orr, a little too closely. "What do you mean, a little different?"

"It's not an ordinary launch plume," Orr said. She continued staring intently at the monitor screen, trying not to look up at him.

He sighed. "This isn't the first time you've thought the Alulans had managed a jump in their launch capability, Orr. Are you sure you want to go on record?" He pointed firmly towards the monitoring camera in the center of the ceiling.

Orr felt her cheeks flush, but refused to let Escalera get the better of her. "I'm telling you, sir, this one is different. The plume brightness, the trajectory angle—"

"Do you have feelings, or figures?"

She colored deeper. "Bringing up telemetry, sir."

Escalera sighed loudly, pulled a rolling chair over, and sat down. Muttering about wanting to get back to his reading, he wheeled his way between Orr and the observer on her left, who gave Orr an angry glare.

Orr looked at the clocks: the 24-hour one for the observation base, and the local clock tied to Ustehhat, the most populous city on Alula. Coincidentally, it was very early morning in both places . . . and that was strange. The launch site was near the same longitude as the standard-time city, and all previous launches had come near midday.

Just as Orr was about to point this out, Escalera whistled. "Ay, caramba. It's still boosting." His voice held traces of confusion and wonder. Orr read the telemetry, and confirmed that this rocket had been boosting for much longer than any of the previous ones.

"Let me check something," she said. She pushed a few buttons, and the image of Alula changed to a close-up of the rocket. It appeared much larger than any other rocket the Alulans had launched.

She felt vindicated.

"Orr, call up a computer projection." Escalera had no doubts in his voice now.

"Already doing it, sir." The image of the planet once again appeared on the screen, showing a long white launch plume. Accompanying it was a blue line, tracing the projected path of the rocket.

She tapped at the screen. "This isn't just another up-and-down launch. Look at that—orbital insertion trajectory. Their rocket program just became a space program." And, Orr thought proudly, it was her discovery.

Escalera studied the projection. "They're not supposed to be ready to launch satellites into orbit yet. According to Sentient Sciences, this should be years away."

By now, the white rocket plume had overtaken the blue projection line, and the computer worked to continue the projection. It clearly displayed an orbit.

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"What do we do now?" Orr asked.

Escalera stared at her for a few seconds in silence. "What do you think we do, Frieda? We wake the Director."

Shanti Kachru fought off a yawn. Everyone on her senior staff was yawning in a cycle of contagious protest at the early hour. Even Amin Az-Zahir, the imperturbable security chief, succumbed. But not her. She had more discipline than that.

Even at this hour.

Escalera finally entered the briefing room, pads in hand. He passed them out and, on a nod from Director Kachru, began his report. "Ladies and gentlemen, just under an hour ago, the Alulans launched their first artificial satellite."

People shuffled in their seats, straightening out their postures as they reacted to the news. To their credit, no one interrupted as Escalera continued. He recited some figures that they could all find on their pads, including the twenty-kilogram payload he estimated the rocket had boosted into orbit.

"There's no telling yet whether there's any instrumentation on board. We detected no radio emissions from it before it swung behind the planet. Once it emerges from shadow in about six minutes, we should get more information."

"Could they use it to detect our presence?" Az-Zahir asked. Inwardly, Kachru smiled, pleased at Az-Zahir's usual efficiency.

"That's not my area of expertise," Escalera said. He turned toward one of the other seated staff members, Winston Chalmers, the head of the Sentient Sciences Department.

Chalmers stroked his plump chin. "I can't imagine how it could detect us," he said with his smooth British accent. "It couldn't spot anything on farside, never mind within our lava tube."

"What about the sensor cluster over the horizon, or our own orbital satellites?" Az-Zahir asked.

Chalmers shook his head. "No. Furthermore, they don't know that there's anything to look for. We are quite safe."

Kachru studied Chalmers sternly over her pad, which she strategically used to cover the yawn finally escaping her mouth.

Escalera resumed. "One unusual datum here is the launch site. It is in the territory of the Tested, as always, but not inside their rocket complex. This one was farther north, and appears to have come from an underground silo. This was meant to be secret."

That did it. Kachru let her pad fall upon the table, drawing everyone's attention as it hit. "Chalmers, why didn't you know about this in advance?"

Chalmers leaned back and held his hands out. "You heard the supervisor. This was a secret."

Kachru didn't blink at his jest. "From your previous reports, the Alulans frequently build underground, out of their weather."

"True,". Chalmers said. "Rather frustrating when you want to see what they build, but informative in its way."

"Yet," she continued, ignoring his tangent, "you could not anticipate that they would launch from an underground facility."

He sighed. "Director, we cannot know everything that happens on Alula. We haven't the observation assets, and those we have are divided rather thinly between our four departments, as my colleagues will attest. Now, if you're offering to increase my share of—"

"I'm not." Out of the corner of her eye, Kachru saw two of the other department heads smiling, probably thinking that they were out of her visual range. "Chalmers, what I meant is, with all the insight you claim into the Alulans—particularly the Tested—why didn't you realize they were capable of an orbital shot?"

Chalmers bristled. "Madam, if you crave mathematical perfection, Scholar Shen of System Sciences is your man." Shen stiffened, but Chalmers carried on.

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"My information is necessarily imperfect, meaning my conclusions are necessarily approximate. We haven't been here nearly long enough to understand Alulan society completely, not looking through the keyhole as we must. If you want certainty, give me a wider keyhole, or give me time."

Kachru hardened her face at his last word. "Oh, no," Chalmers said. "Tell me you aren't about to make the decision I think you are."

"The decision is already made," Kachru said, encompassing the room with her statement. "Earth's policy toward Alula is secrecy. They are the first intelligent alien race we have discovered, and the United Exploration Council will not risk disaster with premature contact. From a hidden base on their inner moon, that risk was acceptable. Now, they have the theoretical capacity to reach their moons. That makes the risk unacceptable."

She stood, no feat in one-tenth gravity, but still sure to bring all attention to her. "We have one option: to begin evacuation of Alula Observation Base One."

The shock held for a long moment. "That's it?" Henry Stark of Planet Sciences said, his voice like clanging metal. "One satellite, and we're bugging out?"

Kachru smirked at his expression. "Yes. We are 'bugging out,' as you put it."

Now the objections came, tumbling over one another.

"We aren't finished charting the tectonic plates," said Stark.

"Our species register is barely an outline," pleaded Andrea Eugenikos of Biosphere Sciences.

"The closest approach of the second binary is only seven years away," said Shen Po-Lin.

"We have to examine its weather effects," added Stark.

"Besides," said Eugenikos, "the next supply and exchange ship isn't due for over four months. We don't have to start anything—"

Kachru held up a hand, and motioned everyone into silence. "You forget," she said calmly, "our emergency ship."

Everyone was put off-stride for a second. "That's only for disaster use," Stark said.

"And this situation qualifies."

"The ship isn't large enough," Shen noted. "It won't carry the entire staff, plus a disassembled base."

"It doesn't need to. Using the emergency ship now means faster notification of Earth, more thorough preparation on their end. It and our regular supply vessel will shuttle between Alula and Earth, until we are gone and no trace of us remains. It is the first step in an orderly evacuation."

Az-Zahir was muttering commands into an interface mike, and reading what his monitor made of them. "Four shiploads will suffice for evacuating the base. Assuming the usual transit and turnaround times, we should be gone within fifteen months."

"Very good." Kachru's gaze returned to Chalmers. "The Tested won't be landing outside our surface lock in fifteen months, will they?"

Chalmers swallowed, and when he spoke, his words sounded carefully crafted. "If I recall my history, twelve years elapsed between Sputnik 1 and Apollo 11. Their progress was driven by national rivalry, about as strong as what pertains on Alula now."

"I will take that as a no." She knew he would give nothing firmer, in his touchy mood.

"If I might ask," said Escalera, almost forgotten in the cascade of events, "who is leaving first?"

Kachru considered the question for a moment. "I will begin a triage list once this meeting is over. I can say this much: anyone scheduled to finish their assignments and leave on the next regular ship will go first."

Shen opened his mouth, but Kachru caught him before he could speak. He subsided without a word.

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"As for the rest," she continued, "have your Section heads submit brief lists of who they can and cannot spare. File your own as well. I wish this facility to operate as efficiently as possible for as long as possible—but be forewarned, my decisions are final."

That left little else to say. "Time to break the news," Kachru said. "Dismissed."

The staff got up slowly, their energy drained by the loss they faced. Stark moved confidentially close to Eugenikos. "A terrible waste," he said.

"Perhaps, but there's no talking our Director out of it."

"Did you notice who didn't even try?"

"Yes. Of all people, I wouldn't have thought Chalmers would—"

Kachru shuffled her feet behind them, startling them and breaking off their exchange. She said nothing, her near-black eyes staying squarely on Winston Chalmers until he disappeared into the corridor.

A beep from the door interrupted Shen Po-Lin as he was stuffing a duffel bag from the mess of clothes scattered around the floor. "Who is it?" he called out.

"It's Winston Chalmers. I want to talk to you."

Shen sighed, dropped the bag, and walked over to the door. He pushed the button which caused the door to slide open.

"Winston, I don't have time."

Chalmers smiled gently. "Yes, I heard." He took one step in and put a hand on Shen's shoulder. "Come on, Po-Lin, I'll help you pack."

"Not 'Scholar Shen'? How informal," Shen said, but smiled. He moved aside to let his friend into the main part of his quarters. He glanced at the clock on the wall. "If three hours ago, you had woken me and asked me what I'd be doing now, I never would have guessed packing."

"If three hours ago, you had woken me, I would have snarled at you and told you that I needed more sleep." Chalmers paused. "In fact, that's what I did."

Shen smiled briefly, but his friend's comment was still not enough to lift his mood. He gestured around his quarters. "I find it hard to believe that in two days, this room won't even exist anymore."

Chalmers nodded. "The tech crew has already started dismantling some of the living quarters." He looked around. "So what can I assist with?"

"I'm not sure yet. But I'm willing to have the company, I guess." Po-Lin went back to stuffing clothes into the duffel bag. "You can help me decide what to keep and what to leave behind."

Chalmers snorted. "We can't leave anything behind."

"You know what I mean. What to abandon. I guess it'll be packed away or destroyed after I'm gone."

Chalmers sat down on one of the two tiny chairs which flanked a small table. He ran a hand through blond hair going to gray and sighed. "Po-Lin?"

Another handful of clothes went into the bag. "Yes?"

"If it's any consolation, I'm sorry."

Po-Lin stopped what he was doing and looked up. He held a blue shirt in his hand. "Do you know how long I've been here?"

Chalmers shook his head.

Shen smiled bitterly. "Thirteen years, longer than anyone else. Except for Kachru: we came in together." He stuffed the shirt into the bag. "And now, just when things are going to get good, we're evacuating. 'Bugging out.'" The words soured on his tongue.

Chalmers gave him a puzzled look. "I thought you were getting sick of this place."

"I thought so too."

"Why the change in heart?"

Shen considered the best way to express his feelings, and then decided to show Chalmers. "Here, look," he said, turning towards his wall screen. "Net-

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work, please display the Xi Ursae Majoris system model coded Shen Oh-One."

"Can't you just call it Alula, like the rest of us?"

Shen smiled. Xi Ursae Majoris was the technical designation, but its Arabic name, Alula—"the first of spring"—enjoyed almost unanimous use on the base. "Alula has a much nicer ring to it, I'll grant you that," Shen said. "But it lacks precision."

"Spoken like a true astronomer."

Within seconds, the screen displayed an image of the two close binaries in the system as four white circles. One pair, designated B and B-prime, had its inhabited second planet highlighted in red. Shen stabbed his finger at the other binary. "See that?"

"Yes."

"That binary will make its closest approach to this one in seven years. Can you imagine the opportunity for astronomical discovery?"

"I certainly can." And geological, meteorological, cultural. Every department looked forward to this approach—or had.

Shen shook his head. "A double binary system, ripe for the studying. All for nothing, now, because of that stupid Sputnik."

Chalmers stood up and walked over to the screen. His hand reached out, and his fingers brushed the circle which represented the planet, the only planet that had another indigenous intelligent race on it, as far as humanity had discovered.

He let his hand fall. "You know, Po-Lin, maybe you don't have to go just yet."

Shen stared at his friend and counted to ten in his mind. Then he sighed. "No, Winston. No."

Chalmers sat back down, and crossed his legs at the ankles. "Why not?" he asked with a slightly truculent tone.

Shen looked towards the door. "I don't want to have this conversation again. Could you please just drop it? If you're here to help me pack, then help me pack."

"But if you don't need to pack—"

"I said, can't you just drop it?"

Chalmers laughed. "You know me better than that."

Shen shook his head. "Sometimes I can't believe that they put you in charge of Sentient Sciences."

"Stop diverting me from my point."

"Which is?" As if Shen didn't know.

"That this would be the perfect time to reveal ourselves."

"You've always said that. First when you pieced together the theology of the Tested, then when the rocket launches began, then—"

"They were all perfect!" Chalmers exclaimed. His voice came close to snarling. "What's wrong with us making contact with the Alulans? Letting them know that they're not alone in the Universe? Wouldn't it be better to treat them as partners in the search for knowledge, rather than subjects under our microscope?"

"You know that's dangerous."

"You only think it's dangerous because for the past twenty years the UEC has said that it's dangerous." Chalmers lowered his voice. "Look, if we just let the Alulans know we're here, now, then there's no reason for the bugout. And you can study the stars to your heart's content."

Shen studied Chalmers for a moment; his excitement had brought redness to his pale cheeks. "Winston, I'd like to, I really would, but—" He turned to the screen. "Network, display the contact protocols list. Continuous scroll."

Immediately the screen filled with text—the official UEC statement on why contact with the Alulans was absolutely forbidden. Shen began to read a few of the statements aloud as they scrolled by.

"'The Alulans are a pre-spaceflight society—'"

"Not anymore."

He glared at Chalmers, then looked back at the screen. "They're 'politically

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divided.' The Tested might welcome us; as part of another test, but what about the other sects?"

Chalmers shrugged. "Earth countries don't agree on everything; why should we wait for the Alulans to be more advanced than we are?"

Shen looked at Chalmers. "What if they're hostile?"

"Oh, leave that alone. We have no firm evidence that they would react to us with hostility."

"We have no firm evidence that they won't, either. We don't really understand their beliefs on the existence of aliens. If we present ourselves, they may act just as irrational as—" Shen cut himself off.

"Irrational as what?"

"Never mind."

"Go ahead, Po-Lin, say it. Irrational as me, you mean."

"That isn't what I meant," Shen said quietly.

"You think my ancient alien visitation theory means I'm cracked."

"No, I don't." Shen felt distinctly embarrassed.

"I'm a scientist, Po-Lin, like everyone here. I draw my conclusions based on evidence. Experts accepted my conclusions in conventional Egyptology gladly, but when I presented evidence that challenged entrenched preconceptions, they resisted like—like you. Take the age of—"

"Winston, please!" Shen could feel a headache coming on; he rubbed his temples visibly, so Chalmers would understand. "Please, not now. I'm under enough stress as it is."

Chalmers sighed. "Fine. We can agree to disagree, as always."

The two friends remained silent for a moment. Then Shen said, "I've really got to get back to my packing."

Chalmers stood up and reached inside a pocket. "I've never seen you with one of Doctor Randal's sketches." He held out a sheet of crisp paper, folded once. "Perhaps you'd like one now."

Shen took it gingerly, unfolding it. The subject was an Alulan, rendered in pencil, with as much anatomical detail as their satellite cameras had managed to reveal. It was quite skilled, if obviously posed to capture both the keen expression on the Alulan's broad, flat head, and the intricate patterns on its back, distorted by the bending of its flexible shell. Shen couldn't tell its sex. That wasn't his specialty.

"It's good," Shen said, "but I couldn't deprive you—"

"Nonsense. Lindsey makes stacks of them. I'm surprised you never got one." He smiled as Shen gave it another look. "Consider it a reminder—that your colleagues aren't the only people you'll be leaving behind."

Shen's face lost its smile. He refolded the paper. Chalmers tensed, plainly fearing he would give it back, but Shen placed it in his bag instead, with some care.

"I've got to go get my own department ready," Chalmers said, shaking his head. "There's a lot of data we won't be able to gather, a lot we're not going to learn, because of the evacuation."

"Perhaps. But it's not our decision."

Chalmers walked to the door, opened it, and hesitated. He turned back to Shen, who was already back to stuffing clothes in his bag. "Just keep one thing in mind, Po-Lin."

"What?"

"If you do change your mind, and decide that I'm right, you've got very little time to do anything about it."

Chalmers left. Shen stood still for a moment, staring at the door, and then returned to his packing.

Chalmers walked briskly, like a man with very little time. He squeezed past technicians with grapplers, laser cutters, and bundled vacuum suits, all of whom were walking in the direction of Shen's quarters. That moved him even faster. His department could wait.

He pushed the signal button on the

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Director's office door. Nothing happened. He pushed again, then knocked, stinging his knuckles on the metal. He was ready to try again when the door slid open.

Kachru was seated at her desk, looking very efficient with her immaculate apparel and white-streaked hair tied back. Her desk, in contrast, was overflowing with computer pads. She looked up, eyes heavy. "I am extremely busy, Doctor Chalmers."

Chalmers heard the formality, but ignored the warning within. "We do need to talk." He inched inside, letting the door hiss shut behind him. Kachru reluctantly set down her stylus.

"Director, I believe you are making a mistake. You are using ill-considered regulations to shield you from making a decision whose importance you fear, and I think fear unnecessarily."

Kachru raised her eyebrows. "How interesting. I did not know you held a degree in psychology." She looked back down. "The evacuation order stands."

"It stands on a false premise," he said, striding forward, his words prepared and practiced, "one that holds us silent, bids us to skulk in shadows. I say it is time to step into the light. It is time to step onto that world."

"Time to indulge your personal fantasies?" she parried. "Do you want to reenact scenes from old video fables, confident in a happy ending?"

"You should know better."

"So should you. You should understand the enormous potential for errors in what you propose. One miscalculation—like yours in judging their spaceflight capacity—could be devastating."

Chalmers could say nothing, his pride smarting too badly. Kachru exploited his silence.

"I should not need to remind you of the security agreement you signed when you were accepted for your research tour. You pledged to make no action to reveal human presence in this system."

That loosened his tongue. "Madam, I resent your insinuation."

Her look stayed steady, betraying no regret, no concession.

He took a step back, needing the space to settle his thoughts. "Very well, consider this. What if we made no active contact, yet maintained our base here? We would continue our studies, with an emphasis on understanding Alulan culture. They will reach this moon in their own time, and eventually discover us. They will have initiated contact, and we will be all the better prepared for the meeting."

There was an instant when Chalmers thought she was considering it. It passed quickly.

"No. Earth's policy is explicit—"

"So send to Earth; at least *ask* them to reconsider."

"—besides which, any ensuing relations would be blatantly biased toward the Tested. Theirs is not the only culture on Alula."

"No, that's true enough." That fact had made studying their civilization immensely more complicated—and absorbing. It also explained why humans gave the planet the same name as the star system: the authorities were loath to 'privilege' one culture by calling it Tehu, or Gikra, or Epteja, or a hundred other candidates from less widespread languages.

"Still," Chalmers said gamely, "someone must be first, since we decline to preempt their radio programming and announce ourselves globally. Why not give the honors to those who worked for it?"

Kachru scowled. "There won't be a first," she said, straining to control her voice. "They are not ready for us."

"The way we act, one could easily argue the reverse. And frankly, your attitude toward the Alulans is just a bit patronizing."

Kachru gave Chalmers a knife-sharp look. "*I* am patronizing?"

"Yes," he said. "You underestimate their resilience. Heaven knows they

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need enough of that, to live on their world. You protect them needlessly, keep them in ignorance." Sensing anger, he changed his tack. "You said years ago that discovering the Alulans was the greatest enlightenment in human history. Let us bring that same enlightenment to them."

Kachru rose slowly from her chair, meeting Chalmers's eyes. "You seem very sure that the Alulans will want our enlightenment. Maybe you really believe they *need* our enlightenment. Feeling a tug of 'White Man's Burden,' Chalmers? A bit cocksure that the natives need your involvement, your guidance, perhaps your control?"

Her voice had turned venomous without rising a decibel. "Granting honors to whoever meets your criteria? That, Chalmers, is what I call patronizing. I am quite familiar with that attitude—and its most famous proponents."

Chalmers was taken aback. One offhand remark, and—? "Director Kachru," he implored, "that isn't what I meant at all. And really, our respective national histories ought not poison our—"

She waved him away, letting the gentle gravity pull her back to her chair. "Go," she said softly. "I have things to do. And you do as well."

She went back to her evacuation schedules. Chalmers managed to walk away without tripping over himself, appalled at the magnitude of his failure.

Amin Az-Zahir watched from the moon's desolate, rock-strewn surface as the emergency ship took off. The pressure suit made him feel slightly confined, but his presence on the surface was necessary. As security chief, it had ultimately been his responsibility to make sure that the Alulans did not notice the launch. That responsibility had been made much harder with the existence of Sputnik 1, the unofficial name everyone on the base had given the Alulans' first satellite.

However, harder did not mean impossible. Az-Zahir grinned. They had timed the launch just right from the moon's far side so that Sputnik 1 would be beginning its crossing of the planet's far side. Even if Chalmers was wrong about the satellite's capabilities, it could not possibly detect the ship.

Az-Zahir watched the ship rise until it almost hovered motionless. Then rockets ignited, accelerating it away from the moon and the planet. Soon it was a bright pinpoint, heading toward a dim yellow star. Then, with a flash, it was gone.

It would take four months to travel the twenty-six light-years to Earth, using the ABC space-bubble drive, and then four months to come back. In the meantime, the regular supply ship—which, Az-Zahir noted ironically, brought replacement personnel as well as supplies—would be arriving here just as the emergency ship got to Earth. Messages could move no faster than the ships carrying them, part of the reason why this departure was so rushed—to inform Earth of their situation all the faster.

Az-Zahir opened the small metal door at his feet, fell in, and shut the door with what would have been a clang had there been air around. He walked down a long incline to the floor of the lava tube, cut by magma flows when the moon was young. He cycled through an airlock, removed his pressure suit and hung it with the others, then strode back to his quarters. Midafternoon prayer was fast approaching; he had missed his first two prayers today, and many more in days past. He hoped Allah was forgiving.

Within a few minutes he had arrived back at the corridor containing his quarters, which he had seen so little since being awakened for that meeting nine days before. He lived near the junction of the work and residence wings, giving him swifter access to any place he needed to be in an emergency.

But something was wrong. As he approached his door, he saw light and shadows dancing on the wall across

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from it, and he heard voices coming from his room.

Someone was in his quarters. Whoever the culprits were, they had sloppily left the door open.

Being in charge of security here wasn't the same as being in charge of security in a less isolated base. Everyone on the Alulan moon had gone through countless clearance checks, and Az-Zahir's job had more to do with keeping the base secure from Alulan discovery than anything else. Still, old habits died hard, and Az-Zahir had made sure that he and his staff would be allowed to carry weapons and act in the manner of all Earth security forces before taking the assignment. He removed his plasma gun from his holster and slowly crept toward his quarters, keeping his back against the wall next to the open door.

As soon as he had reached the door, he spun around, both hands holding his weapon perfectly steady. "Freeze!" he shouted.

The two people in the room shot up their hands.

"Turn around, slowly."

As they did, Az-Zahir recognized them: Marcus Cogsgrove and Elian Nadel, two of the men in support services, technically subordinate to him.

"Hello, sir," Cogsgrove said, smiling and showing his chipped tooth. "Can we put our hands down now?"

Amin nodded and restored his gun to its holster. He looked around his room. All the furniture was gone, and a pile of cardboard boxes stood along one wall. "Gentlemen, what is going on here?"

"Sorry, sir," Nadel said, looking contrite. "Director's orders. This wing's already partially dismantled, and she's consolidating the inhabitants into other rooms to complete the job. This room will be gone by tomorrow."

"We've been packing your things," Cogsgrove said, "and we'll be moving your boxes. Your furniture's already over in your new quarters."

"I see," Az-Zahir said slowly. He understood the necessity of what they were doing; still, it had come as a surprise. And he hated surprises.

Cogsgrove and Nadel looked anxiously at each other, and then Cogsgrove said, "Would you like us to leave you to finish up, sir? Your new living assignment is on the pad on top of the boxes."

Az-Zahir nodded, and the two men slipped past him and out of the room. He walked over to the boxes, and noted with relief and gratitude that they had left his most treasured possession sitting on top of the boxes as well: the printed and bound copy of the Qur'an, which his father had given him the first time he had left Damascus for space. His prayer mat was rolled up next to it. He would have to remember to thank the two men next time he saw them; as he recalled, although both were Christian neither was very religious, which made their consideration regarding his religious items that much more significant. Especially since the hour of prayer was at hand.

But first, Az-Zahir pulled his radio off his belt and contacted the Director's office. After identifying himself to her assistant, Kachru's clipped voice came over loud and clear. "Yes, Az-Zahir, what can I do for you?"

How best to phrase this? "Director, the ship has departed—and I returned inside to discover that my quarters were being emptied of my personal belongings. Without my consent, I may add. This is the sort of thing I'm starting to expect from Chalmers, not from you."

"Chalmers?"

"Yes, especially after his 'White Man's Burden' behavior, earlier this week."

Az-Zahir heard mumbling from the other end, and then Kachru came back on. "I wish I knew exactly how that comment got out. In the meantime, Amin, please do accept my apologies. You've been so busy that I haven't had a chance to tell you personally when we'd need to evacuate your current quarters."

"Apology accepted," Az-Zahir said

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aloud, even if she had overridden the security protocol for his quarters. That was the only way anyone could have gotten in. "However, next time I would appreciate it if you would allow me to do my own packing. I have many personal items which I consider just that. Personal."

"As do we all, Amin. Believe me, next time I won't get in your way. Assuming we have the time. Kachru out."

Az-Zahir turned off the radio, and took a moment to relax himself, clear his mind of all extraneous thoughts. In the midst of all the chaos of the past hours and days, he had craved order and peace. Once he felt ready, he unrolled his mat upon the floor, knelt, and began to pray.

Alone in her office, Kachru sighed as she got off the radio with Az-Zahir. So many details, so much "hurry up and wait" going on. And she wasn't looking forward to her next meeting.

Finally, there was a beep from her door. He had responded to her summons, five minutes late. She pushed a button on her desk, and the door slid open.

Chalmers appeared with a pad in his hand. "You wanted to see me, Director?" He stood in the doorway, waiting.

She resented his impertinence. He wasn't going to enter the room until she invited him in. She briefly considered sliding the door shut, but thought better of it. Knowing Chalmers, he'd jump out of her office instead of in.

"Please enter, Doctor," she said. "We need to discuss some concerns I have."

Chalmers settled himself into a chair. "So what are your concerns, Director? Afraid I'm going to disobey Earth protocols? I got your message loud and clear before."

She shook her head. "Yes, Doctor, but that isn't it. I was harsh with you, and I do not apologize for it." She paused. "The fact is, however, that you know more about the Alulans than anyone else here." Kachru spoke through clenched teeth; she did not want to say what came next, especially given the way Chalmers had spread stories about their last meeting. The last thing she needed was for the base to see her position weakened and his strengthened. Still—"I need your help. *We* need your help."

"*My* help?"

"We need to make sure that this base is left in such a manner that the Alulans never suspect that we were ever here. Now, I can easily imagine what would make one of us suspicious, but I have a harder time knowing what might be a clue for an Alulan."

This was it; she knew Chalmers had her now. He could help, but it would be on his terms, not hers. And she would have to watch his work carefully, to make sure he followed through.

For a moment, Chalmers looked stunned. Then he smiled broadly.

"I'm sorry, Director. But I have to follow the evacuation protocols to the letter."

Kachru bit off a laugh. "You've never followed anything to the letter, Doctor. What are you talking about?"

He leaned forward and shoved the pad over to Kachru. "Read this. In the event of an evacuation, department heads have the duty to collect as much more information as possible within the time window. This work holds priority over all others, including assisting the evacuation procedure."

Kachru read the pad, and when she looked up, Chalmers was still smiling. "I've been refreshing my memory on what my department must do in case of evacuation, Director." He pointed at the pad. "This is our top priority, not what you want."

Grudgingly, Kachru said, "I agree."

"You do?" Chalmers asked, his voice climbing in pitch. He sounded surprised.

"Yes. You have your time; make the most of it."

Chalmers grunted. "Very well, then,

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Director."

Just as he began to get up, Kachru spoke. "But, Doctor, please note." She waved the pad. "This doesn't apply when it comes down to the final wire. In the last few weeks, everyone—and I mean *everyone*—must work on the jobs I assign that ensure the successful completion of the evacuation. Do I make myself clear?"

"Crystal, madam." Chalmers hefted himself out of the chair and left her office, without waiting for her to dismiss him.

Not that she cared. She was exhausted, and looking ahead to many more exhausting days and nights. Kachru left her office and went back to her undisturbed quarters for a nap, all the while grateful that rank still had its privileges, along with all the headaches.

Phase Two

The Analysis Complex was the heart of the base. Every bit of data passed along by the monitoring room went to one or more of the four department centers there. Scientists sifted the information, formed their hypotheses, and consulted with other departments, through the computer network or in the Hub, located dead center in the complex to indulge the psychological comfort of physical consultation.

So vital was the Analysis Complex that, two months after the emergency ship had departed, not one bolt of it had yet been disassembled. It would be the last place broken down and packed away, if the staff had its way.

Sentient Sciences boasted the busiest piece of the Analysis Complex, rarely less than half-full during any shift, even after the first wave of evacuation. Rank, however, carried its privileges, in this case a quiet nook that served as Winston Chalmers's inner office. Even having a colleague there didn't make it uncomfortable.

"We were right," Chalmers said, raising the magnification on a live satellite feed. "They've uncovered another Mew of the Eye."

The screen showed an excavation site in late afternoon, mostly covered in tarpaulins as protection against the elements. Despite that, the stone slabs of what had been underground walls were visible. Bipedal forms milled around them, their postures appearing stooped to a human eye from the carapaces on their backs. Chalmers looked up at the near wall, papered with sketches by Randal, comparing them to their models.

"The joins look primitive," Louise Georges said, stroking her chin. She had been at Alula for only two years, but had already advanced to deputy department head after the evacuation of Edgerton. "I'd say fifteen to sixteen hundred years old, right at the inception of Testism."

"I wish they had kept the sunhole intact," Winston said.

"You should have asked them to," Louise replied, her natural lilt veiling some slyness. Winston only smiled.

The sunholes were for observation of transits, the dwarf star of the B binary crossing the face of its larger, brighter sibling. It appeared as a small dark pupil turning in an eye socket, crossing every four days by human reckoning. For many Alulans of millennia past, it had been taken as the eye of God gazing upon them.

Clouds drifted along, obscuring the view. Winston sent a request for a new satellite angle, and grew increasingly agitated as his request waited in the queue.

"What was that?" Louise asked, hearing him mutter something scalding.

"Az-Zahir," he repeated partially. "It's his fault for deorbiting half our low-orbit satellites."

"He had valid cause. The Alulans will have reason to track objects in orbit now." She saw Winston's hurt look. "I didn't say I agreed with the premise, but it is a rational conclusion."

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Winston shrugged. "I oughtn't have brought it up. Now I feel guilty for doing this bit of telearchaeology, rather than broadcast analysis to predict the next launch."

"Lindsey Randal and Edi Agbeve are quite capable. Don't you trust who you assigned?"

"Certainly. I just trust myself more." He grimaced. "Not that my trust is warranted, seeing how I missed the first launch—and the second."

"And gave up to fifteen hours warning for the next three," Louise added.

"Oh yes," Winston said. "I'll never forget how Kachru actually told me 'Good work' for the last one. I could live on those kind words alone for a month. Add a stale peanut, and I could stretch it out to three."

Louise covered her laughter with a long-fingered hand. "I had worried that your humor had deserted you. I've never known that to happen for long, even during the worst of your . . . controversies."

Winston managed a wavering smile. "You have always been very understanding of my eccentricities." He let it stand there, turning his attention slowly back to work.

They spent a long stretch gleaning what data they could through the thickening clouds, before local sunset fell. They scarcely spoke, scarcely needing to. The next time Winston strung three words together, it was to pick up the conversation as though nothing had intervened.

"It's important to know how their spaceflight capabilities are advancing, when they'll reach the next plateau. When they'll reach this moon."

"We'll be gone by then," Louise said.

"I'm not so certain." He let out a long breath. "I should hope it never happens."

"What?"

"It would preserve our presence," he said, his voice dulled. "If their aspirations flame out, if they fall back, our need to leave falls away as well. Even Kachru would have to admit that."

Louise gave a slow nod. "It could happen. Enough storms or temblors at key launch facilities—"

"They built them away from fault zones. I checked that with Stark."

"—they could be diverted by an attack from the Chev League, or cowed by their threats. The Mayor Sovereigns' speeches have grown belligerent of late." She felt as much as saw his wince. "Or perhaps they would simply lose interest."

"They would never do that!"

She lifted her eyebrows calmly. "I didn't really think you wanted them to fail, Winston."

He dropped his head. "I don't. There's been so much against their development—hostile weather, tremendous tides, frequent quakes—that should have kept them in the Stone Age. A large close moon is responsible for much of that. I almost feel guilty just living here."

"Yet they've surmounted it all."

"Yes—and the Tested most of all." A soft sneer crossed his face. "Science and religion have had a nasty running feud for centuries on Earth. A one-sided affair lately, and all the more spiteful for it. Here, though, they found a better way.

"God challenges His creations with the hostility of their world, and judges them by how they persevere and build despite it. Science is no threat; it is almost a sacrament. Fifteen hundred years old—rather youthful as far as religions go—and it has carried them so far." A quiet bliss lit him softly.

"Carried the Tested," Louise reminded him.

Winston turned a wary smile on her. "You still think the other blocs on Alula were technologically ahead until recently, rather than scrambling to keep up with the Tested? Perhaps so. You see," he said merrily, "I'm not dogmatic with my theories *all* the time."

"A good thing," Louise said, matching

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his brightness. "We'd have proof by now, if Alulan broadcasts weren't so euphemistic, so elliptical, so—so—"

"So that's why we should ask them ourselves," Winston said. "In all your years in Egyptology, Louise, did you never feel frustration? You gathered dusty data, devised your theories, unearthed new data that might or might not support you. Never could you match your hypotheses against the living culture. It maddened me, more times than I can count."

"Many things madden you," she said gently. "Those frustrations are why our skills were so crucial. We needed to devise the best approximations possible, so the next approximations would be closer still to the target, to the truth. It's like mathematics without calculus. You can still solve difficult questions, but it takes far more patience and pains-taking."

"Precisely. Pains we don't need here. Why waste our lives calculating every piece of a diminishing series, when we can start taking the differential with the single word 'Hello?'"

Louise said nothing. Winston soon joined her in silence. They finished some last observations before the excavation site sank into night. "Our shift is over," she said some indefinite time afterward.

"Go ahead. I'll stay a while. Something about those walls . . ." She was almost out of the alcove before he turned. "I will see you tonight, won't I?"

Louise smiled. "Of course."

Louise was there in his quarters that night. So were several dozen other coworkers.

They were meeting over the Network, all of them people who had expressed desires not to abandon the base so precipitately. Over half were from Sentient Sciences, and the group tended toward youth and lower seniority. A large number of them had only Ph.D's, like Chalmers, or even less.

Their meetings were unacknowledged; Chalmers hoped secret. This was their third, and already some despair was setting in.

"She would not listen to me," said Dionijs Euwe, the System Sciences head since Shen's evacuation. His glutinous accent made for hard listening now. "She suspected no connection to you, Doctor Chalmers. Her obstinacy is on principle, not personality."

Chalmers nodded. "I'm sure you did your best, Scholar Euwe. We'll simply have to send more people to reason with her. Although after that imperialism comment she made to me, I sometimes wonder if she's open to reason. Still, we must keep trying."

"And failing?" Edi Agbeve said. "We cannot shift her singly. We must act in concert. The petition is our best hope."

"We agreed to wait on that," Chalmers reminded him, "present it when the supply ship arrives, for maximum effect. It doesn't help us now."

"Then maybe it's time to look at fallback positions," Agbeve said. "Let's think about what signs we can leave behind for the Alulans."

"I'd rather not," Chalmers grumbled.

"It's premature," said Karin Nilsmark of Biosphere Sciences.

Soon dozens of voices were clashing with each other. Chalmers held his ears, a futile gesture, then pressed a button to cut off the audio for ten seconds. That always cooled off the group.

He restored sound, but someone beat him to the first word. "Winston," Georges said, "perhaps it is time to think about it."

Chalmers frowned, but not for long. "All right," he said, before the gabble could rise again. "Let's look at this from an unusual angle. Suppose you were looking for evidence on Earth's moon that alien sentients had once established a base there."

There were moans of protest. Many were part of this group despite Chalmers's more notorious notions.

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"Wait," Nilsmark said, "I think I see where this is leading. Go ahead."

"Thank you. Now, say you were one of the early explorers on the Moon: an Apollo astronaut, a staffer at the Mare Crisium base, something before the colonization period. What evidence could you uncover of that alien presence with the tools and knowledge of your age? The aliens try to leave the place pristine, but they're only human . . . er, you know. What not quite obvious detail might have slipped their minds?"

Finally, there was pensive silence. "They would sweep up their physical tracks," Lindsey Randal said, "but the sweepers they used would leave their own patterns. We could look for those."

"Surely they would avoid any obvious pattern," Euwe said. "Metachaotic analysis would work to uncover second and third-order effacements, but that's not a twenty-first century discipline. We could leave long-term traces to be discovered if Kachru—I mean the aliens—are uninterested in such detail."

"She won't be." Chalmers said. "To her, no trace means exactly that."

"What about element ratios?" Agbeve suggested. "This moon is volatile-poor like ours, and living beings leave behind a lot of volatiles. One unusual chemical analysis of the regolith might give us away." He snapped his fingers. "Hydrogen exhaust from ship's thrusters! How would we erase that?"

"She's thought of that, too," Chalmers said. "I have it on good authority Kachru ordered the ship to use the antigravity plates as far as it could before igniting thrusters."

"We can still leave hydrogen ourselves, or nitrogen or carbon—"

"Would higher radioactivity readings tip them off? Or is the surface so irradiated—"

The clamor began rising again, and Chalmers's thoughts wandered. He really needed to break them into subgroups—or would those groups go spinning off into chaos too?

"A single nugget of gold might be inexplicable any other way—"

His eyes turned of themselves to his shelf, almost on top of him in the tight quarters. There sat a small gilded cat, carefully restored by experts, looking down on him with perfect indifference. It was part of the Hawass Prize he had won in Egyptology twelve years ago. Artifacts like that existed licitly only in museums, and to the annual Hawass winners. It was a gesture of great respect—and yes, he had been respected once.

The artisan had perfectly captured the natural aloofness, the high disdain. No wonder cats were sacred to the Egyptians, in their godlike detachment. Of course, Chalmers had his own theory about ancient Egypt and feline appearances. That was why he was here, with only this personal item brought from Earth to keep him company.

He had fought lonely, doomed battles before. What souvenir would he carry away from this one?

"Winston?"

Her voice brought him back. "Sorry, Louise, I went wandering. What did we conclude?"

She sounded weary. "That there are things the Alulans will notice, and things the Director will miss, and that the two probably don't overlap."

"No," Chalmers murmured, then more forcefully, "No. I won't accept that. There's something we can leave behind that she'll overlook. Kachru is observant, but she is not perfect. Nobody is."

And perhaps, he did not say, that goes for our own visitors as well.

Chalmers sat with two other department heads, Andrea Eugenikos of Biosphere Sciences and Henry Stark of Planet Sciences, on the stage of the assembly room. The large hall was filled with the new arrivals from the regular supply ship, which had just arrived. Kachru had wanted to make the announcement to

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everyone in person, and she had requested her senior staff be present on stage along with her.

But, Chalmers noted wryly, the three of them weren't really the whole senior staff. Az-Zahir was working the crowd, of course, along with his security staff, and Euwe was missing, probably to avoid drawing attention to Shen's absence. Chalmers didn't really want to be present either. In the months since his cabal had first started meeting, Chalmers had been trying to juggle both his regular duties and the ones he had assumed upon himself. He really didn't have the time to be present at this meeting, which as far as he was concerned was a waste.

However, the Director had insisted. He glared at her back as she stood at the lectern, ready to address the crowd. Then he looked away.

As soon as everyone was seated and quiet, she began.

"I would like to begin by welcoming you all to Alula Observation Base One. I would also like to begin by inviting you to settle in and get started on your duties." She paused. "However, as much as I'd like to do those things, I'm afraid that I can't."

Murmuring came from the crowd, and Chalmers saw a few people nodding their heads. Kachru waved her hands, and everyone fell silent. "Some of you have probably heard rumors by now, although I had asked the staff to keep everything quiet, so I could break the bad news to you myself." She took a deep breath. "Almost five months ago, the Alulans launched an artificial satellite. We're evacuating the base."

Pandemonium. Once again, Kachru waved everyone to silence. "I know this will come as a shock to all of you, but I'm afraid that almost all of you will be getting back on that ship and returning to Earth."

Chalmers leaned forward when he heard her say, "almost." What did that mean? As far as he knew—as far as he had been told—all the new people would be returning to Earth, along with a smattering of the current staff.

Kachru finished off by laying out a schedule for the next evacuation wave and asking everyone to report to their departments for assignments. As the crowd stood and a conversational hubbub filled the auditorium, Kachru turned to leave via the backstage door. Chalmers tried to intercept her, but she slipped out just as Stark and Eugenikos came over to ask him questions. He would talk to her later; after all, he had work to do.

Sure enough, when he got to his office, a long line of new arrivals stood at the main door. He greeted them perfunctorily and walked past them, where Louise Georges was handing out assignments to everyone.

"Hello, Louise."

"Hello, Winston," she said, glancing up from a pad with a grim look on her face.

"I'm going into my personal office. Let me know if there's anything I need to deal with."

"Actually, Winston—" She handed him the pad. "Here. You're not going to like this."

He barked a laugh as he took the pad. "Not going to like what? There's already plenty I don't like."

He started to examine the pad, but Louise interrupted him. "Why don't you read it inside?" she asked, pointing towards his door.

He shrugged, took it inside with him, and behind his closed door began reading. By the time he sat down at his desk he was furious.

The pad displayed the list of personnel assigned to return to Earth on the ship, and now Chalmers knew what Kachru had meant by using the word "almost" when speaking to the new arrivals about who was going home. Some of the new arrivals were actually staying at the base, their berths to be filled by current staff members.

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Including a suspiciously long list of names Chalmers recognized.

Chalmers lunged out of his seat and ran out of his office. With a quick "She can't do this" uttered to Louise, he pushed past the line of new arrivals and ran down the corridors until he found himself at the Director's office. He pushed the beeper, and when the door didn't slide open, he started banging furiously upon it.

The door opened, and he almost fell into the office. Kachru sat at her desk, looking more exhausted than she had in the past five months, but Chalmers didn't care. He marched over to her, shouting and waving a finger of shame at her.

"How dare you! Gutting my department! Just when I need my people the most!" Including his cabal of supporters, although he couldn't admit that aloud.

He stopped at her desk, looming over her. She fixed him with a steely glance. "What, not waiting to be invited in before ranting?"

Chalmers ignored her comment and shoved the pad in front of her face. "Look at this list! Over half of the new evacuees are from Sentient Sciences!"

Kachru held up her own copy of the list. "A little less than half, actually. Forty-eight point two percent."

"So I'm off by one point eight percent." He tapped his pad. "But I can play at mathematical games, too. Over seventy percent of these names were drawn from the petition!"

"I wouldn't know," Kachru said dryly. "I've been far too busy dealing with the evacuation to study it closely."

"You're clearing out my people in order to make room for new arrivals. This is still unconscionable."

"No, Doctor. It is perfectly reasonable."

Chalmers sat down. "Prove it."

Kachru sighed. "Az-Zahir has relayed your protests of the destruction of our low-orbit satellites. Their deorbiting is part of the evacuation protocols, which you are so fond of reciting. Tell me, Doctor, which department is most reliant on those satellites?"

Chalmers remained silent, and Kachru continued. "Sentient Sciences, of course. We're not going to be receiving as much data on the Alulans anymore, and it is pointless to keep more staffers than required to analyze what we will have. As for the new arrivals who are staying, they all have skills or expertise that will be useful in closing down the station." Kachru paused. "In short, my decisions are completely logical."

Chalmers shook his head. "Plausible deniability, that's all it is, Director."

Kachru narrowed her eyes. "If you like. Frankly, Doctor, I don't care what you call it. It's all by the regulations. Earth would back me up to the hilt. And they will, if you bother to file a complaint."

Not that it would matter, thought Chalmers; it would take almost nine months for any complaint to be processed, and it would have to go out on the same ship that was taking away much of his staff. The reply would come on the ship that removed the last of the base.

"You should have told me earlier—" he began.

"Just you?"

He waved her comment away. "Us, I mean. All the senior staff. You've obviously had this planned for some time; why didn't you post the list until today?" He suspected her real reason: by announcing this list so late, it would be too late for complaints, but he doubted she would say that.

"Doctor Chalmers. Please remember one thing. I do not take orders from *you*. You take them from *me*. Is that understood?"

"I was just—"

"*Is that understood?*"

Defeated, Chalmers sighed. "Yes, Director. Understood."

"Then get busy."

* * *

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Chalmers thought he might be too busy to nurse recriminations. He wasn't.

He had the duty of integrating the new Sentient Sciences members—the interlopers, the changelings displacing people he knew and trusted—into the department. He went through the motions, not bothering to conceal his resentment, and didn't much care whether Louise picked up the slack.

His bitterness rankled for two weeks, as friends said their good-byes, as strangers took their places, and as techs tore down more of the base every day. One night, he imagined he awoke to see the ceiling being pulled away, the air blowing out of his room with hurricane ferocity, hurling him into blackness.

He awoke for real, afraid to take a breath that might not be there. His computer screen was flashing, announcing a staff meeting that morning. That news banished any thought of returning to sleep.

He arrived at the meeting with an aching head and a poisonous mood. Department heads and deputies were there, including those who would be departing on the ship that afternoon. Euwe and Eugenikos were in one corner, looking forlorn and forgotten, while Paul Branchaud of Planet Sciences was getting a quiet talk from Olivia Passarella, the new deputy chief.

Chalmers dropped into an open chair next to Louise, barely mouthing a "Good morning." He lifted his eyes long enough to spot Az-Zahir, and dropped them again.

Kachru entered moments later, and went straight to business. Her main topic was the need to set rational research priorities, as observation resources continued to tighten. Chalmers had heard or anticipated it all before, though he did roll his eyes when she referred to the increased pace of satellite "retirement."

"Doctor Chalmers." Kachru caught his eye, with difficulty. "This would be a good time for you to report on the current status of the Alulan space program."

Chalmers leaned back, crossing his legs. "How coincidental that you just mentioned these 'retirements.' Thanks to Mister Az-Zahir's diligence, the Alulans now have more satellites, by number and total mass, in low Alulan orbit than we do." He peeked to see Az-Zahir's reaction, and enjoyed it.

"A striking comparison," Kachru said dryly. "How close are they to demonstrating manned capabilities? We'll understand a certain lack of precision."

The casual condescension was like a slap in his face. Chalmers had a solid figure—one he hadn't intended to give her before. This made his refusal far more satisfying.

"Why do you care?" he snapped. A shocked hush fell. Chalmers paid it no attention. "If they did slow down their program, it wouldn't slacken the pace of your evacuation one iota. Don't pretend it really matters."

"It does, Doctor." Kachru's voice was strangely measured, perhaps restrained by the new personnel. "It affects the radius of their possible detection capacity, the speed with which our other satellites are—"

"Retired? Lovely euphemism, that, for such a massive overreaction." Chalmers was standing now, ignoring the hard tug on his sleeve. "Their chances of spotting our satellites are infinitesimal, but that doesn't stop you. Destroying them is just one more way of wielding power, the kind of autocratic power that lets you enforce a policy your subordinates do not support!"

Kachru met his eyes, fire clashing with fire. "I will tell you again, it is Earth's policy. My opinion of that policy—and yours—is irrelevant. It's what we agreed to when we came to this base."

"That policy is destroying what little work we can still do here!"

"No. It isn't. You are."

"Me?" He swept around to the other

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staffers. "Do you believe *this*?"

Still tightly controlled, Kachru took a stack of pads out of a drawer. "A list of complaints from new Sentient Sciences members, citing hostility and lack of cooperation. Complaints from all three other departments, about diminished sharing of data, frictions initiated by people from your department, arguments, even a fistfight."

She slammed the pads onto her desk, hard enough to bounce in the light gravity. "You've polarized the staff, undermined interdepartmental communication, and now you withhold data about the Alulan space program. You have made this base a battlefield, Chalmers."

"If peace is defined as a lack of opposition, then it's a righteous war." He gasped for breath, his head spinning. "I'm surprised you haven't banished me to Elba already, to make things easier for you. But I suppose I'll be on the next ship out now."

Slowly, Kachru reached for one leftover pad. "As a matter of fact . . ."

Chalmers stabbed a finger at her. "Ha! I knew it. It's all politics!"

"Wrong!" Seething red was burning through her dark face. "It's your stubbornness, your pettiness, your arrogance. You're one of the best researchers we've ever had here, but your attitude now is undoing all that's gone before. If we're to salvage something from our last months here, we cannot afford to have you here ruining it."

"If that's true," Chalmers shot back, "why am I not leaving today?"

Kachru trembled, fighting herself. "Don't make suggestions, Doctor, if you don't want me to agree to them."

Chalmers snorted. "Fine. I shan't. Brief me later, Scholar Georges."

Before Louise could utter a word of protest, Chalmers was through the door, out of the reach of further temptation.

Phase Three

Everyone on the base was kept very busy during the month after the regular supply ship had left, with a mix of evacuation jobs and standard duties. As a result, the cabal that Chalmers had organized was never able to have a full meeting, relying instead on smaller meetings to recruit new staff who had just arrived. Chalmers was chagrined by this, but he himself was not exempt from being too occupied, as he needed to keep his eyes on the Alulan space program. Late in the month, the Alulans attempted another launch, and most of the staff was relieved to see it fail and explode on the launchpad. Chalmers and Edi Agbeve were the only ones rendered distraught over this failure, for reasons which both agreed needed to be kept secret.

Finally, Chalmers managed to organize another full meeting of the cabal over the Network. Their ranks were diminished, but Chalmers had insisted. Especially given the news he had received from Kachru when the ship had arrived so many weeks ago.

"Is there nothing we can do?" Louise Georges asked, as she had asked Chalmers privately these past weeks.

Agbeve said, "First they get rid of Lindsey Randal, now they want to get rid of you. It isn't fair."

Chalmers leaned back in his seat and clasped his hands together. "The next ship isn't due for a few months yet. We still have time to come up with a plan before Kachru forces me out. Which is the main reason I thought it was high time for another full meeting. Any ideas, folks?"

There was an awkward silence as people glanced at each other's images. Then Agbeve spoke.

"I know I was one of the first to suggest leaving a clue," he said. "But we simply don't have the time to consider it anymore."

Chalmers felt stunned. "You can't be serious."

Dionijs Euwe spoke up. "I don't know, Winston. Maybe Edi is right.

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Maybe we should just forget the whole thing."

Chalmers shook his head. "We can't."

"But with so many of us gone," Euwe said, "how could we come up with a workable plan?"

Chalmers leaned forward and glanced from image to image. "Look, we know that astronauts visited ancient Egypt—"

"We do?" Karin Nilsmark asked.

"Yes, *I* do," Chalmers said testily.

"I don't know that," said Moshe Kruv. One of the new staff members in Sentient Sciences who arrived on the last ship, Kruv had been recruited into the cabal shortly after his arrival. "What are you talking about?" he asked, picking at his dark beard.

A collective sigh went up from a few of the cabal members, but Chalmers ignored them. "That's right, Moshe, I haven't had a chance to explain it to you. It's all very simple, really. There is strong evidence that a bipedal felinoid alien race landed in the Nile Valley around thirteen thousand years ago."

Moshe's brow crinkled. "If aliens had landed in Egypt, I'd have heard about it."

"The theory's not widespread," Chalmers replied tartly, "but the evidence is. The Sphinx, for instance—there's considerable evidence of it having been built in 10,500 BC."

"I prefer BCE," Moshe said. "Before the Common Era. Besides, you don't need aliens to build the Sphinx."

"Ah, but they did. Earth was coming out of the last Ice Age. The Nile was a relative trickle, incapable of supporting the huge numbers of people needed to build such a large statue as the Sphinx. They must have had outside, skilled help. Whose help? Well, consider the lion's body on the Sphinx: an inversion, most likely, transposed to honor some human potentate. And facing it toward the constellation they named after the lion, probably for their home star being there. And let us not forget the Egyptian pantheon: deities with human bodies and animal heads."

Kruv blinked his glazed eyes a few times, saying nothing.

"Winston," Louise said, "is this leading anywhere?"

Chalmers stared at her for a moment, then nodded. He'd try to convince Kruv later. "The point is that we know of these aliens through indirect evidence, not open declarations to later ages. Now, we may not be able to cobble together a Sphinx, but we could still just be 'sloppy' during the evacuation. Couldn't we?"

For a moment no one said anything. Then Louise said, "We still haven't figured out a signal that Kachru would miss. And she's really intent on making sure that the Alulans never observe us."

Chalmers smiled. "Have any of you considered the possibility that the Alulans have already observed us?"

"What do you mean?" Louise asked, her question echoed by a few others.

"Look. We know that their public radio broadcasts tend to remain silent on the progress of their space program. Perhaps that's because they don't realize that we can also monitor their secret transmissions, and they think they're keeping us in the dark."

A few people started murmuring about how that made sense.

Louise nodded. "That's one possibility for the Tested's general silence on their space program, Winston, I'll grant you that. On the other hand, there's another possibility—"

Chalmers's screen beeped, and a band of text appeared at the top.

"Hold on, everyone. Escalera is trying to contact me." Chalmers instructed the Network to place everyone's image in the lower right corner of the screen, and he took the call from Escalera.

"Julio. What can I do for you at this late hour?"

Escalera looked grim. "I have some information I need to bring to Director Kachru. I thought—I thought you might want advance notice. You may even wish to come with me to present the in-

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formation jointly."

Chalmers frowned. "What is it? What happened?"

"The Alulans have sent up another orbital satellite."

He stared at Escalera for a second and chortled. "So? Tell Az-Zahir to have his department track it."

Escalera shook his head. "This one is a little different."

Chalmers sighed. "How is it different?"

"It's manned."

"That's impossible!" Chalmers said. "Their first manned ship failed; they wouldn't—"

"What do you mean, their first manned ship failed?"

Chalmers felt a chill run through his body; in the heat of the moment, he had revealed too much.

"Give me twenty minutes to check the latest radio broadcasts," he said gruffly, ignoring Escalera's question. "I'll meet you at Kachru's office." He switched off the Network screen and dashed out.

"What do you mean, it's manned?" Kachru asked, looking first at Escalera, then at Chalmers, and then back at Escalera. Her stare unnerved Chalmers. He had rushed over to Kachru's office as quickly as possible, in hopes of getting there before Escalera. But he had failed, and was now wondering just how much Escalera had told her.

"We mean," Escalera said in measured tones, "that there are Alulans on it. Three of them, from what we've been able to determine."

Everyone sat in silence for a moment. Chalmers still felt nervous, but he also felt a twinge of joy. After all, the Alulans were making swift progress, which was good. On the other hand—

"Doctor Chalmers, Escalera tells me that when he reported the manned launch to you, you reacted as if this was not the first one. Would you care to clarify?"

"No, madam, I would not."

"Hm." She turned to the intercom. "Edi Agbeve, please report to the Director's office."

Chalmers shifted in his seat.

Kachru turned back to him. "Doctor Chalmers, would you not say now that my haste in organizing the evacuation was justified?"

He mumbled agreement.

"What was that, Doctor? Please speak up."

"I said, yes, perhaps your haste was necessary."

"Thank you. Could you please tell me why you didn't predict this development?"

He bit his lip. "No, madam, I cannot."

"Really?"

Chalmers thought for a moment about telling the truth, but rejected the notion. Instead: "It's puzzling, madam. I can only plead precedent."

"Precedent?"

"Human precedent. We've tended to base our predictions on the schedules of the first human space programs, the ones organized by the defunct superpowers of the twentieth century. And it took the human race four years to advance from satellites to putting people in orbit."

The door opened, and Agbeve walked in. He looked surprised to see Chalmers and Escalera there. Suddenly Chalmers realized that instead of rushing to Kachru's office, he should have spoken to Agbeve first. But it was too late.

"Director?" Agbeve asked.

"Doctor, come in and please have a seat."

Agbeve shrugged and did as she said. "What's going on?"

"Please tell me about the first manned launch you and Doctor Chalmers discovered."

Chalmers jumped up and tried to speak, but Kachru silenced him with a wave of her hand, and he sat back down. "Well, Doctor Agbeve?"

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Agbeve glanced at Chalmers, then turned back to Kachru. "Well, I guess you found out. The last launch, the one that exploded on the pad, had three Alulans in the rocket."

Kachru nodded. "And how did you know that?"

"It was in the radio broadcasts."

"And as the chief translator, you naturally went to Doctor Chalmers with the news. When he found out, he ordered you to keep the content of those broadcasts secret."

Chalmers had no choice but to keep quiet, but it didn't matter. Agbeve would tell Kachru everything, and then all their plans would be for naught. She'd probably toss him onto the surface without a suit, if she could.

But Agbeve surprised him. Glancing quickly at Chalmers, he said, "Not exactly."

"What do you mean?" Kachru asked.

Agbeve looked down at the floor. "It was my idea, not telling you the truth. I forced Doctor Chalmers into it."

Thank you, Edi.

"Do you expect me to believe that?" Kachru asked.

"It's true," Chalmers interjected quickly. "And even if you don't believe it, you have no way to prove otherwise."

"Fine," Kachru said. "I'll accept your version of events. So tell me, Doctor Chalmers, now that all the cards are on the table—what's going on with the Alulans?"

"Madam?"

"I've been reading up on the history of human space programs. From the very beginning, setbacks—especially those which cost lives—were usually followed by a period of latency. How is it possible that one week after a failed launch kills three Alulans, they're sending up another manned rocket?"

Chalmers shrugged. "Maybe they refuse to agonize over their dead. I would have thought that they would lionize their dead for taking their god's challenge, but perhaps they simply consign them to obscurity for failing." He stroked his chin, thinking. "Their radio broadcasts seem to indicate that the opposition to the Tested are becoming more influential. Perhaps that's why they are rushing their space program."

"So they may be here sooner than we thought," Kachru said.

Her voice was quiet, Chalmers noted. She seemed to be taking all the news with relative equanimity—even the news of his collaboration with Agbeve. Perhaps—

"Director?"

"Yes?"

"May I humbly suggest one more time a way out of our difficulty? If we were only to reveal ourselves—"

"No!" she shouted.

"But, Director—"

"Doctor, I have had enough!" She jumped out of her seat. "You refuse to take no for an answer. Over and over, you bring it up. You rile up others, with those stupid petitions!" She took a deep breath, seeming to regain control of her anger. "Doctor Chalmers, from now on, please send Scholar Georges whenever your department has something to report. You may consider that an order."

Chalmers nodded.

"As for you, Doctor Agbeve—you are hereby confined to quarters, and your Network privileges are revoked. I'll have Az-Zahir post a guard at your door." She looked at all three men and shook her head. "Dismissed."

Agbeve left quickly, not even looking at Chalmers as he rushed out. Chalmers hoped Agbeve would forgive him later.

Chalmers and Escalera walked out together, and once they left the office, Escalera spoke. "You shouldn't have done that, Winston. Kachru's under enough pressure as it is."

"We're all under pressure, Julio."

He shook his head. "Hers is different. You're just responsible for your department. She's responsible for your department, and mine, and the others. Plus the evacuation. If the day we finally make

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contact with the Alulans, they tell us that they discovered our base. . ." He shook his head again. "Earth will have Kachru's head on a platter."

A small sacrifice, Chalmers thought, to achieve his goals.

Holding his plotters together took more effort than Chalmers expected. Several were shocked at how easily Agbeve had divulged the suppression of data and left the group, fearing Chalmers had pressured him and that they might be next under arrest. Others left out of frustration at their plodding progress. A few said they were tired of hearing about ancient astronauts, but Chalmers put that down to hiding their true feelings.

Still, Chalmers kept a solid core of people with good ideas. As weeks turned into months, those ideas became a plan.

Alulans had to contend with a world in greater constant motion than humans did. Four suns, two moons, weather that never seemed settled: complexity of all kinds was the norm. Chalmers made a psychological leap from there, with some anecdotal support, to postulate that Alulans had a natural proclivity for assessing dynamic situations.

The inner moon, by contrast, was a static place, interrupted only by whatever detritus, from dust to comets, came crashing down. It was a passive environment, providing sharp contrast to any signs of activity, to an eye well conditioned to observing and interpreting such signs.

Humans would leave hundreds of patterns in the course of evacuation, even if nothing more than their footsteps walking to the ship. These would be swept away, of course—but shadows of the erased patterns would remain, and even the act of sweeping would be dynamic, containing unconscious patterns.

Chalmers's group came up with ideas for patterns they could create without their looking deliberate, that would survive effacing best. That was merely supplemental, though, to what the base would leave behind as a matter of course. If no extraordinary measures were taken to cover their tracks, Chalmers believed the Alulans would notice the patterns sooner or later.

They played with other ideas—depositing telltale concentrations of unusual elements or patterns of static charges in the regolith—but this one had an aesthetic style they could not resist. With a week to go before the next ship due, Winston Chalmers could actually feel at peace about having to leave.

Until Louise Georges entered his office one morning.

"I've seen a copy of Director Kachru's evacuation plans," she told an impromptu meeting of the cabal that night, "including the part containing details of how to conceal our presence. She intends to draft our antigrav cargo loaders for other capacities, primarily to avoid leaving tracks that would have to be erased."

Chalmers had expected an immediate uproar, but there was nothing apart from some murmurs.

Louise continued. "She also plans to cannibalize an antigrav plate from spare parts for sweeping purposes, and program it with an algorithm provided by John Durst." Durst was in Sentient, another new arrival handpicked by Kachru to stay, and an ex-cryptanalyst. "They are confident they can shuffle the regolith randomly, leaving no erasure patterns for the Alulans to recognize. With my limited expertise, I would say their chances are excellent."

That broke the ice. "That's unbelievable," Karin Nilsmark said. "It sounds like Kachru got her best advice from us, and . . . no."

"Yes," Chalmers said tightly. "That is exactly what happened. She got her advice from us. One of us, that is, perhaps more."

Now the clamor came, as bad as

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Chalmers had feared. He heard snatches of names in accusing tones, voices rising in self-defense, all order fleeing. He cut the sound, and was tempted not to restore it. Eventually, he did.

"—from happening again!" Nilsmark was saying, oblivious that she had been unheard. "We have to find the turncoat among us!"

"No," he said, the weariness of that word gripping their attention better than any shout. "No, we don't."

"You aren't even angry?" Kruv said.

"Angry? More angry than you could know. Angry enough to . . ." He looked at a bare wall. "After Louise told me what she had learned, I came this close to erasing our department's data cache out of pure spite. Four months of research, wiped off the Network in a moment. That's how badly I wanted to lash out at Kachru. That's how much I hated her."

He forced his eyes back to the screen, to his colleagues' frozen faces. "Thankfully, I didn't. My life has been about gaining knowledge, not destroying it. As much as I want not to deny knowledge to the Alulans, I would not deny it to Earth either. Temporary suppressions, yes; permanent ones, no. Anger brought me to the brink of an unforgivable act. Don't let it control you the way it almost did me."

He had to swallow hard before he could breathe again. It had been hard, but they needed to know.

Nilsmark was first to speak. "We still have to find the informer, so we can plan our next move in security."

Chalmers laughed gloomily. "You must not play chess, Karin. There is no move after checkmate."

"Winston—" Louise began.

"Kachru's been ahead of us all along. She knew of our parlor conspiracy for months, and rather than break it up, she exploited it masterfully. Let us face facts: she's beaten us."

A few voices raised half-hearted protests, but Chalmers stilled them. "Inside of a month, I'll be on a ship returning to Earth, as will most of you. I propose we take the fight to Earth with us. We will be too late to forestall the final evacuation, but perhaps, without the mastermind Kachru to thwart us," he said with a smirk, "we can persuade her superiors to alter their isolationist stance. Our challenge remains. If we cannot meet it here, we must meet it elsewhere."

"I won't have that chance," Nilsmark said. "What will I do here?"

"Your work," Chalmers answered. "The conspiracy, on Alula, is at an end."

"No! You can abdicate, but I won't—"

The picture display disappeared, replaced by the face of Shima Nakata, watch supervisor in the monitoring room. "Doctor Chalmers," she said breathlessly, "the latest launch—"

"You used override priority?" he said pettishly. "How important can this be? I already knew about the launch."

"The rocket detached a new type of capsule. It masses about eighty kilograms, too small to carry an Alulan, but—I've already informed the Director—"

"Informed her of what?" A warhead? They had never picked up a nuclear test, but chemical, biological—were the rivals of the Tested right all along?

"It's boosting on a lunar insertion trajectory. Doctor Chalmers, it's heading right for us."

The lights suddenly dimmed, and a klaxon began sounding in the corridor. Chalmers was gone even before the emergency summons from Kachru began flashing on his monitor.

Twenty-four hours after the klaxon sounded, the satellite entered orbit around the moon. Chalmers spent the next few days in the crowded monitoring station, alternating shifts with Louise, grabbing a few minutes of sleep here and there when he could. Plentiful supplies of coffee and other stimulants were kept coming, as the staff of Sen-

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tient Sciences stayed busy recording and translating the Alulan radio broadcasts as quickly as their high-orbit satellites intercepted and relayed them. It was vital for the base to know, as soon as possible, what the satellite had detected, if anything.

Meanwhile, the rest of the base went into "stealth mode," something that had never been attempted before. Power output was reduced to the bare minimum need for life support; lights were dimmed; surface excursions were canceled. Outgoing radio transmissions were halted completely, leaving satellites to their own devices, effectively halting data gathering.

By the end of the first day of orbit, Chalmers and his staff confirmed that the new satellite was definitely a photographic mapping probe. Throughout the second day, they sweated over the transmissions that they had intercepted from the satellite, and continued their frantic translation of Alulan voices over the radio.

Their stealth seemed to be working—but the emergency ship was due to return within days, and there was no way to contact it before it broke its bubble and appeared in-system. One photo of it would be a disaster. It could stay safely out of range, but that meant no landing, and no evacuation progress, while the probe operated. The staff began steeling themselves for a long siege.

By the middle of the third day, however, Chalmers calmly called everyone in the monitoring station to attention. He stood in the center of the room, with Louise at his side. "We would appear to be out of the woods," he said flatly.

"How so?" Escalera asked.

He lifted a pad, which contained the translation of the latest Alulan space program broadcasts. "According to the latest reports, the transmitter on the lunar satellite has failed. They did manage to beam back several photos of the moon's surface, but we've intercepted them all. Only one long-range picture included our base area, and its resolution couldn't possibly make us out. We are quite safe."

"How did it fail?" Nakata asked. "Is there any chance of it becoming active again?"

"From what we can gather, a connection between a battery and the antenna came loose. It's extremely unlikely they'll be able to fix it." He paused. "We'll need someone monitoring it closely for at least the next few days. But I think the rest of you can safely relax."

He turned to Louise and handed her the pad. "Louise, please take my report to Kachru, and tell her that we can probably stand down from stealth mode." He yawned. "I'm going to get some sleep."

The Analysis Center was back to normal, or at least back to equilibrium. The technical crew had been working there for two weeks, their disruptions disrupted in turn by the probe's arrival. They were done now, and Chalmers calmly surveyed the damage to Sentient Sciences.

One of the walls had moved in a dozen meters, cutting floor space almost in half. Chalmers felt an instant of panic for the terminals behind it, before remembering that they were crated and ready for loading now, not sitting in vacuum. A whiff of hot metal lingered from the reconstruction, stinging the nose. Personnel filled every remaining station, with some waiting in line for available space. That crowding would not last long.

Chalmers could see some stations tuned to surface cameras, watching a familiar ship settle toward the surface of the moon. It had left nine months before with the first evacuees. He stopped by one monitor to watch its antigrav plates raise a puff of dust, just before the landing bars deployed and the ship touched down.

"The beginning of the end," Chalmers said.

Louise jumped in her seat. "Winston," she said, switching the monitor to some-

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thing else and looking distinctly embarrassed.

"Don't worry about it. I'll be in my office. Oh, and you'll have my report by this afternoon."

His office was still intact, though the outside smell had penetrated. He settled at his desk to write. He needed to complete his report on the state of knowledge of the Alulan civilizations, and his recommendations for study in the last months remaining.

He treated it seriously, adding and revising for hours, though it was really a paperwork formality. Louise knew almost everything he did about the Alulans. She would be fine as the next—the last—department head.

His monitor flashed, notifying him of a staff meeting. Annoyed, he shut it off. It was supposed to ignore those notices. It had for four months.

Chalmers went back to writing, until a rap on his clear door interrupted him. It was Louise. He hit the door open button. "Come on," she said, "the meeting."

"Have you forgotten, Louise? I don't go to staff meetings any longer."

"Kachru wants you this time. She won't start without you, so don't keep everybody waiting."

Chalmers submitted to the inevitable. "I suppose our Director can afford to be magnanimous now," he said as they walked off. "Perhaps there's a small party, in celebration of my departure. Is that the surprise you're keeping from me?"

"What? No, no."

"Louise, are you quite all right? You've acted nervous all day."

"Well . . . I have been meaning to say . . ."

"Say what?" he asked, offering a smile.

Louise got hold of something inside her. "That I wish your group the best of luck on Earth."

"Thank you, Louise. I suppose four months in a sardine-tin spaceship should give us time to plan our appeal to the Exploration Council. I'll be most high-minded; won't even bring up the secret identity of the Sphinx." His mouth twisted. "One hopeless cause at a time, right?"

Louise was saved from answering by their arrival at Kachru's office. They sat quickly, under the Director's silent gaze. Kachru picked up a pad.

"The evacuation ship delivered a message from the United Exploration Council. To quote the most important paragraph: 'You are ordered to evacuate Alula Observation Base One as rapidly as possible. All precautions to insure against your detection, directly or in later native exploration of the base site, must strictly be observed.' My policy has been confirmed."

There it was: her vindication, as though it was ever in doubt. Chalmers thought it a bit of unseemly gloating, though she never once glanced at him during her recitation.

"However—" Kachru showed a flash of irritation "—the method will be altered substantially. Quoting again: 'Personnel will be evacuated on seniority basis. Those with least time on-site will be first to return to Earth.'"

There were murmurs. Chalmers's eyes widened, as he did some quick calculations.

Kachru set the pad down. "This is unexpected—indeed, it overturns our plans at the worst moment—but it is also an order. We will follow it. I will have new evacuation lists for you momentarily." She started giving orders to her terminal.

Louise nudged her neighbor. "I won't need to see that report, Winston. I'm going to be on this ship."

"Yes," Chalmers replied faintly, "and I'm not." He shook the cobwebs from his head. "And most of our—ahem, friends—are rather junior. Even more of them may be going home than before."

Kachru was done quickly. She gave pads to the senior staffers, wearing an opaque frown as she handed one to Chalmers. He scanned it, and surely

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enough, he was one of the few procontact plotters in Sentient Sciences staying behind.

"You're going to be very busy informing your subordinates," Kachru said, "so I'll let you go now. Meeting adjourned."

Chalmers held his tongue until he was in the corridor. "How kind of her," he told Louise, "to leave us the dirty work."

"I'll announce it to the department, if you like."

He thought, as Henry Stark squeezed past them. "No. I'm department head, and apparently staying that way. It's something I should tell them." He glared back at the office door. "There's something I should tell the Director as well, but she has the privilege of not listening."

Louise steered him by the arm. "We'll announce it together—but quickly, before rumors begin to spread."

"What, in this facility? Who would ever imagine that?"

Midway through the loading of the supply ship, Chalmers went to see Kachru. Given the fact that he was now staying until the last evacuation, and Louise was technically no longer serving in Sentient Sciences, Kachru had acquiesced to the need for Chalmers to report to her again.

He found her hard at work making notes on a pad when he entered her office. Her hair looked grayer—no, that wasn't it. It had grown ragged at the temples, the strands thinner.

She looked up. "Hello, Doctor. Is the evacuation going smoothly?"

The eyes shocked him: darkened, sunken, the hatching ground for the wrinkles across her face. She was about his age, and he was scarcely in his first youth—but she looked old. Had the last months been that hard on her?

Had *be* been?

"Doctor!" Kachru was impatient, and that anger put energy back in her face. "How is the evacuation going?"

"A-as well as can be expected. Director, I have some . . . interesting news."

She put down her stylus. "Interesting? Not good or bad, but interesting?"

It depended on who heard it, Chalmers thought, but settled for saying, "Judge for yourself. Political tension on Alula, between the Tested and the other two main confederations, has been rather high. The Idridari and the Chev League have claimed that the Tested space program has sinister military aims. Some of the independent city-states have echoed those concerns, drifted toward their orbits."

"That I know," Kachru said. "What has changed?"

"The secrecy. The Tested government is finally acknowledging the program publicly. They have denied any military aims—the Chev don't take them at their word, though I do—and outlined their plans for exploration."

"Exploration?"

Chalmers nodded. "Of their moons, for a start. This one first."

Kachru's face paled. "I see. Did you manage to get any information about their timetable?"

"Nothing exact. You can query your agents in the monitoring room. They'll confirm I'm concealing nothing."

"What—?" Kachru stopped, discarding the pretense, accepting his knowledge sedately. "Any educated estimates?"

"Soon," Chalmers said. "I've discarded my last illusions about judging Alulans by human standards. Based on their previous headlong pace, I estimate they'll make their first attempt at a landing within six to twelve months."

Kachru tapped her stylus against the top of her desk. "Six months, you say. Not, perhaps, four?" The last ship was due in five.

"Even if I guaranteed that," he replied with light irony, "you wouldn't believe it."

Kachru nodded absently, and Chalmers spoke aloud the thought they were both sharing. "The Alulans may

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manage to reach us before the evacuation is complete."

"Well," Kachru said, and she stopped tapping her stylus. "We'll just have to see to it that it doesn't happen."

"There's not much more you can do," Chalmers said. "You've evacuated this base as fast as you could have."

Kachru tipped her head. "That sounds suspiciously like a compliment."

"It's a factual statement, nothing more." Chalmers decided that one more try couldn't hurt. He sat down across from Kachru, and as softly as possible, said, "Director?"

"Yes?"

He tried to be deferential. "Ignoring my own leanings for the moment, don't you think it would be wise to start developing some contact protocols? If the Alulans exceed even my own predictions . . ." He trailed off.

Kachru stared at him, and for the first time in a while, smiled benignly. "Doctor, thank you. I shall consider it. But in the meantime, the evacuation process will have to go forward, at a stepped-up pace. Dismissed."

Chalmers stood. He saw the usual high-handed arrogance in that smile, and it annoyed him. "Very well, Director. I look forward to receiving your updated schedule."

Dwelling a moment on the meeting he had just left almost got Chalmers lost. His room had been dismantled a few days after the ship's arrival, another morsel for Az-Zahir's insatiable machine. The move to new quarters was less traumatic than it could have been, since he was already packed for his aborted voyage home.

He needed a second to orient himself, and finally hit upon the right corridor. Down, turn right, third door on the left—and look who was there.

"Weren't you on the ship, Louise?" he said. "I didn't think they were letting anyone return to base once they were boarded." He finally looked closer at her. "And why are you looking so distressed?"

Louise coughed hoarsely. "Could we go inside?"

Chalmers led the way. No sooner had he closed the door than Louise spoke. "I know the identity of the infiltrator, the one who passed our theories on to the Director."

"Really? Well, that explains your mood."

Louise held back a shudder. "I didn't know whether you still cared about who it was, but you have the right to learn. It's your choice to make."

Chalmers considered. "How reliable is your information?"

"I'm certain. No doubt whatsoever."

"None?" The furrows on his brow smoothed away. "All right, I would like to know."

"Are you sure?"

"I just said so," Chalmers said, starting to lose patience. "Who was the informer?"

Louise drew herself up. "I was, Winston."

Chalmers felt himself sway. The room took on a bright fuzziness. His lips moved to say "No," but he couldn't hear the word.

"I have great respect for your abilities, your intellect. I even find it easy to tolerate your . . . eccentricities." A smile almost surfaced through the pain. "But you allowed your desire to reveal ourselves to the Alulans to go out of control. Anything not working toward your goal was enemy action. There was no sense of proportion."

"Louise, how can you—"

She waved away his words. "At that awful meeting, where Kachru recited all the ways you were undermining work here, I realized she was right. I had seen it, first-hand. We were violating our commitment to obey Earth's policies, and she was struggling to hold this base together. It was chaos or order. I chose order. I went to her; we struck our bargain. I betrayed you—to keep my promise."

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Chalmers had sagged against a wall, pulling a sketch loose. "Why are you telling me this?" His voice drifted, torn loose from reason. "Why? Why?"

Louise found a reserve of composure. "I had to be honest with you, with all of you. Respect demanded that." Her gaze wavered, but held. "I'm telling all the members, leaving notes for them . . . but I knew I had to face you, or there was no facing myself."

He stayed rooted in place. He clenched his fists, knowing they would do nothing. He struggled to show something other than shock, but could not.

Louise resisted the miserable pity as long as she could. "I'll go now," she said, in time to preserve some dignity. She did not look back.

Chalmers managed a step toward the door as it closed. "I—" he said before stopping himself.

It was pointless. What did he think he could say to retrieve the situation? "I love you?" The time for that was long ago, and it wasn't even true any longer.

He had met Louise Georges fifteen years ago in Egyptological circles. He had been taken at first by her beautiful looks, her vivid red hair and slender body. But he had also been impressed with her intellect and her compassion. Their paths had crossed with casual frequency, and little by little he found professional amity becoming something else. He didn't breathe a word of it, not daring to risk humiliation. She had the higher degree, the greater respect: he didn't feel equal.

So he set about raising himself to her level, and in a meteoric streak of brilliant work, achieved it. The Hawass Prize should have broken down the barriers, cleared his path to declare himself. In the flush of success, though, he overreached himself.

Awareness of the discovery of the Alulans, and the nascent studies of them, had filtered through his tight professional focus. It stirred notions within him, which coalesced into an earth-shaking theory. Egyptologists had always been prone to ideas about "ancient astronauts." He thought he would find a receptive audience.

He stopped pressing his theory quickly, before the damage to his career was total. The embarrassment stalked him in all the work he did thereafter—and incidentally erased any notion of approaching Louise. His application for outpost duty was an admission of defeat, its acceptance a relief more than a triumph.

That was over nine years ago. When Louise arrived seven years later, he found the old fires dead, but the friendship stronger than ever. Their relationship was akin to a chaste marriage, an intellectual intimacy guarded by respect and trust.

Trust. How strong a bond.

How fragile a bond.

The ship left three days later, carrying almost all Winston Chalmers's remaining friends away. He sat in a dark office, pretending to match weather patterns to rocket launches, and silently thanked God it was gone.

Phase Four

Isolation had some compensating advantages. One was the impossibility of betrayal by people one didn't trust in the first place. Another was absolute freedom of action, without others whose reputations had to be considered.

Chalmers spent his spare hours poring over technical texts, painfully translating them into slow advances on his project. With the right reprogramming, the satellite communications relay perched on the edge of nearside could be augmented for much more powerful transmissions. If he could reach Alula with one message, Shanti Kachru would be thwarted yet. It would mean his career, but he counted that a comparatively small loss.

After three weeks, he was perhaps a quarter of the way there. Eight hours lat-

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er, after his shift in the Analysis Complex, he was nowhere. His personal files had been cracked, the programming code he had written erased.

Chalmers spent a night in panic, expecting to be hailed before Kachru by the strong arm of Amin Az-Zahir. It never happened. When he did pass Az-Zahir in the corridor days later, he thought he saw a knowing glint, but nothing else.

His spirits imploded. Kachru felt so secure that she could let his transgression pass without the slightest reprimand. That itself said more than any punishment could.

He made work his solace, his purpose. He focused himself completely, narrowing his vision tighter and tighter. The attitude fit the work: every day, the pipeline of information constricted a little more. He imagined Az-Zahir was enjoying the work, vectoring satellites to plunge into Alula's primary suns, spinning them away like beads tumbling from a broken necklace.

The rocket facilities grew distant and hazy in their dwindling sight. Chalmers could no longer predict the next launch even a day in advance, save for the time the Tested announced one to the world. Two others he didn't know about until the monitoring room tracked the satellites in orbit, having launched from the hemisphere pointed away from the moon. Kachru didn't hold her silence then, but it was a muted criticism. Even she could understand the handicaps bedeviling him now.

The workers in Sentient Sciences began to complain. He wasn't leaving enough of the dwindling flow of work for them. With a month to go before pickup, he relented, going back to working single shifts.

Chalmers did not spend that time idle. He volunteered to work with the technical crews.

Az-Zahir forbade it. Kachru, after a few more days of polite, restrained petitions, overruled her security chief. "She wants every working hand she can taking down the base," Az-Zahir snarled to Chalmers in his office. "That doesn't mean I have to give you soft work—or that I won't be watching you at every moment."

"That suits me," Chalmers said mildly. He knew Kachru would approve his petition. The hard part was watching Az-Zahir smile as he thought of ways to redress all Chalmers's insults of the past year and more.

It began with a week of dismantling what the chief called "effluvial systems"—and what the tech crews called a great many other things. Chalmers assumed he would fit in best by doing his work without complaint. He soon learned he could do better with lots of complaints, if they were directed at the right things and people with the right breezy crudeness.

Even before that on-the-job training, the technicians took a liking to him. "Why shouldn't we?" Elian Nadel told him. "Every scientist at this station demands things from us, and we're lucky to hear 'Thank you' once a day. You volunteer for the worst duty there is here, and don't shirk a minute. Like you? We're ready to make you crew boss. Pass over that piece of pipe."

"Here you are." He only grimaced slightly at what he put his hand in. "And thank you."

"For what?"

Chalmers grinned lopsidedly. "For all the times I forgot."

Soon, the weeks ran down to days. More scientists began joining the tech crews, as draftees rather than volunteers. Az-Zahir rode herd over them as much of the day as he could muster. Ramadan had begun, and he tried to match fasting hours with sleeping hours, with uneven success that began to take its toll.

One last manned launch came up before the storm season hit the rocket bases. It performed docking maneuvers for a few days, then reentered. The anxiety that this was the moonshot turned to

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relief—or vice versa in a very few cases.

Chalmers kept up his vigil, until the due date for the supply ship arrived. He continued it after the day passed without event. People began to speculate. A damaged engine might mean weeks or months of repairs. It might mean waiting until Earth sent the other ship to pick them up. Some worried that their lately departed friends might be stranded in deep space.

For Chalmers, it meant the slow rekindling of old, faint hopes. They did not last long.

The final supply ship—now an evacuation ship—had arrived two days ago, and Kachru had ordered the dismantling of everything remaining on the base within a week. All departments were geared towards this goal, with the exception of a few people in Sentient Sciences, ordered to continue monitoring the planet until the last possible moment. That moment would come when the last sensor cluster, located on the edge of the moon's near side, would be taken apart.

Chalmers sat in the monitoring station, where he pretty much was now living, along with three members of his staff. One person kept an ear on the Alulan radio transmissions, another watched their satellites. Chalmers had taken the task of keeping an eye on the planet for himself; at least the weather patterns might stave off boredom. He watched the clouds move past swiftly, and the flashes of lightning appear in the sky, depressed that the storm season meant no more launch attempts.

Another flash of lightning broke through the clouds, and it took a moment before Chalmers realized something strange. The flash was lasting a lot longer than normal. Instead of vanishing without a trace within seconds, it stubbornly continued its existence.

That wasn't lightning. It was a rocket launch.

A huge launch plume developed on the planet's surface, along the path of the flash. Chalmers's eyes got wider as the plume seemed to continue to stretch, the line of smoke extending further and further. Could this be—?

He gulped nervously and looked around. No one else was looking towards his screen, and no one else seemed to have noticed. Very carefully, so as not to arouse anyone's attention, Chalmers focused a surveillance camera on the plume. The picture that came up was of a multistage rocket, the kind that would be overkill if all one needed to do was get a satellite into orbit. Chalmers had the computer project the trajectory of the current rocket, and a blue line appeared on his screen.

The line ran all the way from the surface of the planet to the surface of the moon.

He smiled; he couldn't help it. After months of planning, trying to come up with a method of signaling the Alulans, it turned out not to have been necessary at all. They were on their way, now; they would discover the base well before the evacuation was complete.

In fact, he could even help it along. He looked up, and verified that the monitoring camera had already been removed from its usual position in the center of the ceiling. For once, he was grateful for the efficiency with which Kachru was running the evacuation; this meant that the only record of the current launch existed inside his computer station.

Chalmers instructed the computer to stop monitoring, and the screen went blank. He ejected the memory crystal which had recorded the launch, slipped it into a pocket, and stood up.

"Folks," he said, and everyone turned to look at him. "There's no point in monitoring the planet anymore. Let's disconnect the sensors and go help with the evacuation."

The other three smiled and nodded and started turning off their screens. Chalmers had judged it correctly; al-

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though he technically didn't have the authority to release them from monitor room duty, none of his staff would question his order. They would rather be doing something physical and helpful than just sitting here. He figured he would keep the crystal and toss it in with his own possessions, a little souvenir of this day—

—when the door slid open, and Kachru walked in.

"Doctor, what is going on?" she said, looking around at the blank screens. The staff members glanced at Kachru and then turned towards Chalmers, deferring to their superior.

"I've given the order for us to stop monitoring," he said slowly. "At this point, we'd probably be more useful helping with the evacuation, wouldn't you say?"

Kachru smiled, showing her teeth. "You must have turned off your monitors a few minutes ago, then. It's a good thing I had the computer programmed to alert me to any new launches." She walked over to his monitoring station, and turned on the screen. Everyone gasped when the picture of the launch plume came up.

"The Alulans have launched a moon rocket," she said. She pushed the button to record the data, and the computer beeped. "That's odd," she said, turning to Chalmers and looking him directly in the eyes. "There's no recording crystal in here."

"I must have . . . forgotten to put one in," Chalmers said. He was aghast at her for circumventing his authority, *and* for having been smart enough to do so.

"That's understandable," she said, as she reached into her pocket for a crystal. She inserted it into the computer and set it to record the data. "Doctor," she said, "would you care to do the honors? We need to confirm our suspicions."

With leaden steps, Chalmers walked back over to the monitor and pushed the buttons ordering the computer to project once again the path of the current rocket. The blue line cut across the screen from the planet to the moon like a gash in space.

Kachru nodded. "My suspicions are confirmed," she said, looking at Chalmers.

He glared at her. "Only some of them, madam," he said under his breath.

"Enough." She took a radio off of her belt, and turned it on. Her voice came over the speakers, and Chalmers winced at the volume.

"Attention, everyone on Alula Observation Base One. Attention. The Alulans have just launched a manned moon rocket. I repeat, a manned moon rocket. The five days we had left to break everything down, pack up the base, and get out of here has just become thirty hours."

She paused. "This is not a drill, this is not a mistake. The computer has confirmed it. I am giving the final order."

She looked at Chalmers, then shouted, "Bug out!"

Within minutes, every person in the base was awake and working. A parade of specialists, many bleary-eyed with sleep, plodded past Kachru's door, leaving with the assignment pads she thrust into their hands. There were no more scientists, and no more time for science, at the remnants of the base.

What remained was little removed from organized vandalism. There was no time for careful disconnections, for every nut and wire in its place. Valuable equipment went pell-mell into cargo containers, sometimes deliberately smashed to make room for more. Computer memory crystals were the only things treated with care.

Soon there were no enclosed spaces left in the base. Work there, or on the antigrav cargo loaders shuttling between the lava tube entrance and the ship, required suits. There weren't enough to go around.

Those suitless went inside the ship,

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stowing containers in the hold. Heliologists and meteorologists worked cheek by jowl with volcanologists and linguists, a leavening of technical crew making sure their inevitable errors weren't too catastrophic. The crates piled up faster than they could stack them, but that would change as suits in use ran out of life support, and their wearers took shifts in the hold during resupply.

Kachru tried to be everywhere, and succeeded in making the impression. Where she couldn't be, Az-Zahir was, constantly in suit-radio contact with her. The bugout remained organized, barely.

There was one instant when she saw Winston Chalmers, recognizable through his faceplate's distortion. He was aboard a small loader, looking inside a container as he closed its lid, and shaking his head. Briefly, she sympathized with him over the destruction—but only for a second. She had no time for more.

She looked at her wrist chronometer. Twenty hours had passed. That long? If her fatigue was any indication, yes. She concentrated furiously on some calculations. Yes, they had time.

One of Az-Zahir's lieutenants appeared, driving a refitted loader. An antigrav plate hung past the nose, jury-rigged into place. It was the eraser.

Kachru hopped aboard from the ground, and pointed the loader over where she had leaped. A shuddering through the deckplates set her whole body on edge. Less than a minute later, it stopped. When she looked over the side, she couldn't see where her footprints had been.

The eraser became her flagship during the last hours of the evacuation. Another loader, carrying a chemical analyzer, sometimes traveled with her. It was sniffing the regolith for any unusual concentrations of elements. Once or twice, its crew lowered a sifter to comb through the dust, removing or adding something in just the proper proportion.

The sniffer made its rounds, then disappeared into the lava tube itself. The fuller-steel braces of the entry were all that remained of the base, and crews began taking them apart as soon as the sniffer emerged. Kachru's eraser went inside for a last sweep, then joined the sniffer, which was now circling a predetermined point on the lava tube roof, offset toward the entry.

The sifter was permeating the regolith with volatiles: hydrogen, carbon, nitrogen, oxygen, and various simple compounds of them. A few other trace elements went in as well. According to System Sciences' best minds, it was a typical proportion of chemicals to be found in a comet of the Alula system.

Kachru waited for the sifter to finish, then went in herself to the thin shaft bored into the surface. She and a crewmember lowered the antimatter explosive to the shallow bottom. She ran a diagnostic on her pad, showing all green.

The explosive would mimic the impact of a small comet on the moon's surface, in just the right place to collapse the majority of the lava tube, including where the base had been. Construction had left a few unavoidable cavities within the tube, and Scholar Georges had told Kachru that the most enduring archeological structure known was a hole. The best way to cover their small holes was with a large hole. Antimatter was necessary, as chemical or nuclear explosives would leave telltale residual elements.

The one piece of imperfect imitation was the removal of rocks from the surrounding regolith. With the evacuation ship still on the surface and vulnerable to flying debris, it was a chance they had to take. Some rocks had been pitched into the ground nearby to imitate the spatter of debris. It would be enough, Kachru thought.

She returned to the cluster of loaders gathered near the ship. They would

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comb the wreckage together, as a last check of the site, after the detonation. They had the time. By Kachru's calculations, they would be away with half an hour to spare.

"Full polarization on faceplates," she ordered over the radio. "Nobody is to look at the detonation." She checked every helmet for compliance, then opaqued her own. Not all the way, though. She had to see to key in the detonation sequence.

She shut her eyes with the last number, but the flash still reached her behind her eyelids. She blinked at the afterimage, even as the reverberations reached her through the graviton curtain of the loader's antigrav plates, jarring bones together.

When her eyes cleared, she saw a piece of the moon falling in on itself. The cave-in was perfect, chunks of lava tube roof tumbling in, one slab pulling in another and another. Everyone watched through depolarized faceshields, expressions of awe visible to Kachru during the instants when she could take her own gaze off the spectacle.

She waited half a minute after the last landslide, as the pall of dust settled. "It looks good. Amin, organize a perimeter recon with all the loaders. Smith, take the sniffer in for one last—"

"Where is it?"

Kachru turned. "Who was that?"

"Nadel, Director." A suited arm waved. "One of the loaders is missing. There were seven here before the detonation, including yours."

She made a fast count, coming up with six. Where could it go? "Who was driving it?"

"I'm not certain." He called some names, getting prompt replies. When he said "Winston?" twice, Kachru's blood froze.

She turned toward the horizon, the one closest to nearside. "There!" She pointed at the dwindling speck. "Amin, enter 'four-seven-clear' on your loader's control pad, and bring him back!"

Chalmers looked back. The loaders weren't moving; the people on them, distant though they were, didn't seem to be either. The bloom of fallout probably still had them mesmerized. That, or Kachru still wouldn't let them untint their helmets. It would serve them right for their meek obedience.

He put on a burst of speed, steering to the left of a landmark hill. That hillock had held the first line-of-sight relay antenna to the nearside array. Both were gone now, the ground beneath them pristine.

Twelve degrees left, he recalled, tweaking his course. Then again, he didn't need to be exact. His destination was rather large.

The mapping probe had taken few photos and fewer close-ups, but two of them were of the same thing: a double crater thirty kilometers from base, past the edge of nearside. The smaller crater was entirely inside the larger, offset toward Alula—the pupil in the Eye.

Chalmers kept his discovery quiet. When others in Sentient Sciences noted the coincidence, he downplayed it. He knew from the start, though, that when the Tested landed, they would do it there.

He would be there first.

He had thought of waiting for the landing itself, of greeting the Alulans who stepped onto this moon. How he wanted to meet them. He could even attempt one of their invocations.

Eill-ota ta heina teyanh dui, koraron dui, ehtanaze dui. God's eye has seen your striving, your reversals, your triumph . . .

But his own triumph would be short-lived. The Alulans weren't likely to be able to replenish his life support. He didn't want to die here—and his colleagues would surely pursue him. There had to be another way, and there was.

One hand patted the small bag attached to his suit's waist. He had packed

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it in his room weeks before, just in case, and managed to retrieve it in the first minutes of confusion, before crews started tearing down his room's walls. He told the technicians who asked that it contained his Egyptian cat, a relic too precious to trust to anybody else.

That was true. It also contained a starchart, hand-copied from Network files, showing Alula and Sol. Also tucked inside was the smallest and simplest audio recorder he could find. The Network had an excellent voice synthesizer, and he hoped his translation skills matched its efficiency. His message would say a lot in a little time—including how valuable his golden cat was to him, how glad he would be if the Alulans could return it.

Chalmers would leave the pouch dead-center in the pupil. Az-Zahir's minions would catch him: he accepted that. They would not have time to find his little tan bag in an endless field of gray before time ran out. That was his advantage.

Earth's visitors had left nothing behind, nothing humans had found, or couldn't explain away. It had meant centuries of ignorance, of thinking themselves alone. How badly had that ignorance retarded humanity's progress? It was a question that tormented him—but now it would never torment the Alulans.

The UEC would have to embrace the inevitable. The Tested could not respect people who shrank from the challenge of meeting a new race eye to eye—no more than Chalmers himself did. The longer they delayed, the worse relations would be when they came. Difficulty now, or debacle later: not even human bureaucrats could muff that decision.

Chalmers would put them in the best possible light with the Alulans, of course. He was the obvious choice as Earth's ambassador. He knew the Alulans best, and would be the one human the Alulans knew at all, the one who had triumphed over so much adversity to leave that epoch-making message.

He would get a tremendous reception; probably his own *chueh-pat*. His colleagues couldn't decide whether the *chueh-pat* was a religious gathering, a political ceremony, or just a ticker-tape parade without the marching and littering. They thought too narrowly, too humanly. It was something of all three, something unique to the Tested. And there he would be, the center of it all, the honoree, the hero.

He felt dizzy, unable to slow his racing breath. This went beyond throwing away his career, excitement enough for an aging archeologist. This was a historic act, altering the fates of the two intelligent races in the known galaxy. This was his own challenge, well met.

He yielded to the giddiness, laughing at what one disgraced eccentric could accomplish.

The loader gave a kick just as it began climbing a small rise. Chalmers went silent, but felt nothing else. Then, on the downslope, it braked hard. Chalmers nearly pitched over the side, but hung on. The loader came to a halt, floating a half meter off the ground.

Chalmers worked the control panel furiously, but nothing happened. The loader hadn't lost power: it was still hovering. He ducked under the panel and pried away the maintenance cover. Nothing had come obviously loose inside, but apart from that, the mechanisms left him confused.

He craned his head around. The rise behind him hid any pursuit. Even the ship was no longer visible. They wouldn't hear a distress call: line of sight . . .

Line of sight. Of course. One simple program, to stop a loader from going too far. Kachru! Again, *again*, she was a step ahead of him!

Chalmers stood up just in time to see another loader pop over the hill. He realized his error. He should have jumped out and run the moment his loader stopped. He wouldn't have eluded them long, but he would have left a mess of

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footprints, perhaps too many to clean up before the Alulan capsule pilots spotted their ship. Time had been on his side, and he had squandered it—was squandering it now.

The loader parked beside his. Two people were aboard—and by the identifying stripes on the suit shoulder, one of them was Az-Zahir himself. How fitting.

Chalmers was ready to bail out and run, when a fresh idea hit him. Their loader still functioned, and they weren't armed. If he could lure them over here, then leap aboard their loader, he might get a second chance, and leave them stranded in the bargain. He backed up to the railing of his loader, tensing his legs for his one chance.

Az-Zahir gestured to his subordinate—then came over alone.

Suddenly, running for it looked good again.

Chalmers clambered over the side, but a strong yank pulled him back. Hard suit materials clashed and scraped, and Az-Zahir stumbled from the collision. Chalmers spun himself loose, but out of control. Before he could recover, a second pair of hands snatched him.

He struggled, wrenching himself in every direction, loosening the grip. Az-Zahir grabbed his flailing arm, and hit keys on his wristpad before Chalmers tore loose.

Even in the midst of his struggles, Chalmers could hear the subsiding of the hiss in his spacesuit. Az-Zahir had turned down his oxygen flow. He thrashed, trying to free his other arm to reach the pad, reverse the act. In desperation, he yanked the pouch off his belt and hurled it. They didn't take the bait.

He flailed and tore, even as a distant roar rose in his ears, as the light around him grew brighter—and winked out.

"He's awake."

Chalmers opened his eyes and blinked them against the harsh bright fluorescent lighting. He found himself lying on a hard bed in a room with blank white walls. His head rested on a large, soft pillow. A man stood on his right, at the edge of his vision.

"Where am I?" He tried to pull himself up, but the dizziness overwhelmed him.

"You're in sick bay, Doctor Chalmers." It was Hiram Greene, medical doctor.

"Sick bay," Chalmers said aloud. "On the ship. Then that means—"

"Yes," Greene said, and Chalmers could hear him smiling. "We made it. The ship's launch was hidden quite well from the Alulan moon rocket. It did give us a scare for a few minutes there, but it all turned out all right."

Chalmers closed his eyes and nodded. "My mission failed," he mumbled to himself.

"I'm sorry, what was that?"

"Nothing, nothing."

Chalmers heard someone clearing her throat, and then Kachru's familiar voice—all too familiar—said, "I'd like to speak with him alone, Doctor."

"Yes, of course," Greene said, and a moment later Chalmers heard a door slide open and closed.

Chalmers opened his eyes to see Kachru standing at the foot of his bed. He stared at her impassively, and she returned his stare.

After a moment, Kachru asked, "Aren't you going to say anything?"

Chalmers gently shook his head. Kachru had won; there was no point in arguing anymore.

She nodded, a somber look on her face. "I will have to report what you attempted," she said softly. "Too many witnesses to pretend it didn't happen."

"Go ahead," he replied. "I don't care anymore."

"I don't believe you. I think you still care. You put too much of yourself into studying the Alulans not to. Here's the proof."

She reached over to the endtable, grabbed a familiar tan bag, and handed it to Chalmers. He recognized it and

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looked inside.

It contained his Hawass Prize, the cat statuette he had intended to leave behind as part of his message to the Alulans. It also contained the starchart and the recorder.

Chalmers almost threw the bag against the wall, but weakness prevented that, both physical weakness and the affection he held for his prize. If only the bag had been missed when he had been carried to the ship. This was the last disgrace. Kachru was using it to play up his final failure.

"I thought you would want your statuette back," she said softly.

Chalmers remained silent, and Kachru sat down on the foot of his bed. "You know," she said, "your final idea was neat, I suppose, but it was too obvious."

That did it. "Obvious? How in the world could you call that obvious? I object to your use of that word!"

"Why?" She seemed surprised.

"I kept that plan well hidden from you, Director. I didn't tell anyone about it. And it almost worked. Don't insult me by calling it obvious."

She looked puzzled for a moment, then laughed. "I meant that it was too obvious for the Alulans. Placing a mote in that Eye? Far too melodramatic. Might as well carve out a human face on the moon."

"I suppose you could have done better."

She nodded. "I suppose I could have, but you could have as well. You could have thought of something more subtle, more befitting the mindset of the Tested."

"Like what?" he said, tired of the game. He just wanted her to go away, so he could forget his failure in a dreamless sleep.

Kachru shrugged, surprising Chalmers: he had never seen her shrug before. "Well, for example, suppose the regolith in the collapsed lava tube had the normal percentage of carbon, but included a fraction of carbon-14, commensurate with the traces we might have inadvertently left behind."

"Carbon-14?"

"Yes. There wasn't any on the moon before we got there, and we might have left some in our wastes. It could easily be passed off as error; if Earth ever found out, they couldn't really hold us at fault. And any Alulans who study the area would know that the carbon-14 can't be natural. It would be indisputable evidence of life having been on their moon, and definitely not native life at that."

She looked away for a moment. "If they were to discover that, I think they could fairly be said to have earned the knowledge it provided."

Disbelieving, Chalmers propped himself up on the bed. He felt a small smile appear on his face. "What are you saying?" he asked quietly.

Kachru got up to leave. "I'm not saying anything at all. I'm merely speaking about the concept of subtlety—a trait which you may lack, perhaps, but that some of us possess."

Chalmers nodded, suddenly glad that Kachru had retrieved his statuette. "Good night—Shanti. And thank you."

She smiled at his use of her first name, and nodded. "Good night, Winston. You may consider yourself welcome." ■

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He Who Carried the Moon

Dean McLaughlin

The history of science is inseparable from that of the people who do it.

Call him Moonbearer.

While checking what seemed a discrepancy between one book and another on a matter that involved him not at all, I discovered a literal translation of his name would be "He Who Carries the Moon." Later, from a news item, I learned the source language to be Sanskrit. Those who know both Sanskrit and astrophysics will know already whose story I tell.

First though, I should explain how I came within earshot when he told what I now know to be a mere postscript to an extremely large tale. It's quite simple; my father was a professional astronomer.

In those days—the years between the early twenties and the middle fifties—astronomy was a minor science of no great interest to the general public. Useful for navigation and nice to know the sun would most likely rise in the morning, but otherwise not touching anyone's life. What it meant was that only a few major universities maintained an astronomy department. Lesser schools, if the subject were taught at all, saddled some junior member of the math or physics department with the job. The number of professionals in the field was small. Everybody knew everyone.

Dad made no major discoveries of the sort that now appear almost weekly in magazines and newspapers. Once he caught the attention of a "Sunday supplement," (back then they were more like supermarket tabloids than the sedate products sandwiched into the weekend truckload) and once made an amusing entry in *The New Yorker's* "Talk of the Town" section. Otherwise, and including those occasions, the few times he came up with something noticed outside the profession he was off the mark in one respect or another, unless you count the time a roofing crew tarred shut a telescope dome, about which he made a fuss.

For myself, it meant that from an early age I would meet or at least hear about people doing work in that science. Often, though, I would have no inkling of their achievements nor even their special interests. Browsing now through books related to the subject, I constantly

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come upon names which I recognize. Sometimes I'm truly startled.

I could go on at length. I'll mention just a few.

There was a man who left the profession to become vice president of a farm equipment manufacturer but who also, simultaneously, emerged as the foremost American authority on the lunar surface until Eugene Shoemaker came along.

One of my sisters babysat for one of the men who developed the process for aluminizing astronomical telescope mirrors. Before that, silver was the surface of choice in spite of having to be done over twice a year because, exposed to air, the silver blackened and turned rough. She was surprised when I told her, myself having only lately found it mentioned in a book. Later the same man developed a similar technique for preparing electron microscope specimens. She knew about that, but only because our high-school physics teacher mentioned it in class. She reminded me; I'd forgotten.

Another sister, working in a pharmacy lab, discovered that the young Afro-American washing glassware was an astronomy graduate student making ends meet between fellowships. Last I heard, he was chairman of his department at a large Midwestern university.

And I heard mention, circa 1940, of a man at Lick Observatory who had some sort of inheritance, owned and flew his own airplane, and whose brother was a poet. Years later came a Christmas newsletter which told, among other things, of the local ceremonies when the brother was honored on a postage stamp.

But for my most elaborate example, I present Sergei and Mrs. G. When, during World War II, the family moved to Cambridge, Massachusetts where Dad had taken work at MIT's Radiation Laboratory, our furniture didn't make the trip as fast as we did. For one or two nights, therefore, we became house guests of Sergei and Mrs. G in Lexington. How they crammed the seven of us in with their own five I do not recall; I do remember the house as not large.

Both were Harvard astronomers. She was British born, he an exile from Soviet Russia. We saw them often during our stay in Cambridge, but at the time I heard nothing of their work. Many years later, from books and magazines, I learned how she, working on her dissertation—at Harvard under the eminent Harlow Shapley—had discovered that hydrogen was by far the most abundant element in the universe, followed by a few percent of helium. Everything else, a minuscule impurity.

Shucks, you say? Everyone knows that? Nowadays, sure. But in 1925, it was such a peculiar notion that she was forced against her conviction to write that, though she could not find where she'd gone wrong, such a conclusion was almost certainly false. Five years later, Princeton's Henry Norris Russell, then considered the dean of American astronomers and whose opinion on the matter had been sought (almost certainly wrong, he'd replied) published his own analysis from an entirely separate collection of stellar spectra. He came to an identical result. Only later was her prior claim to the discovery brought to attention by another weighty figure in American astronomy, Otto Struve.

I repeat: none of this did I know in 1943, nor for many years after.

Ultimately, she served for a time as Chair of Harvard's astronomy department. Her name turns up in feminist discussions of women in science. A "Science's Compass" article in a recent issue of *Science* focused primarily on her career. A while back I asked an SF editor how much real science he knew; his principal claim; at Harvard he took a course in astronomy taught by . . . but you're probably way ahead of me.

As for Sergei, well, a friend who majored in astronomy at Harvard—not Hal Clement, I should make clear—once

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mentioned the remarkable star S Doradus in the Large Magellanic Cloud, possibly the most luminous star known. His superlatives intrigued me to the point that I searched for details and found an excellent summary in *Burnham's Celestial Handbook*. There I learned that Sergei had published some interesting work on the star in 1943, so I assumed my friend had heard of it from Sergei himself. Not so, my friend replied; he learned of it from A.E. van Vogt's "The Storm" (*Astounding*, October, 1943).

For a while I thought I was on to something, especially since my friend said also that, when Mrs. G saw him reading an issue of *Astounding* which featured a van Vogt story, she remarked, "I know him." However, checking "The Storm" against the specifics in *Burnham's*, I find them a poor fit. Further, van Vogt's data was standard textbook stuff at least as far back as 1926 and, since van Vogt made use of known science infrequently, I suspect John Campbell was his source of information.

That's how it goes when you do research.

From time to time, Dad would bring a guest home for dinner, sometimes a local colleague, sometimes a visitor from out of town. Twice, of the latter category, Moonbearer came. Working from the few landmarks I have, I suspect it was during his second visit that he let drop the footnote I'm about to pass on. I'll tell it, though, as if it were the first; it simplifies the telling and alters nothing substantial.

My sisters and I were instructed to be on best behavior, and informed that there would be no meat that evening. Moonbearer was coming. He was a vegetarian. Somehow it was also communicated that this was an important man.

At that point I'd already encountered the name at least twice. I even knew about his circumscribed diet because, some time prior, Dad had chuckled about a letter from a friend who had been next to Moonbearer at a banquet where the main entree was rare roast beef. This was set in front of Moonbearer, red and raw, with all the usual lack of ceremony and, so Dad's friend reported, "I've seen cows hurt worse than that and still giving milk." I still think it's a good line, but on first hearing—I'd come in sort of in the middle of things—I did not understand what made the event so appalling. It was Moonbearer, I was informed. So? I wondered. Who he?

He's from India. He's a vegetarian.

Oh.

I've since discovered it was not quite the *faux pas* it might seem, as Moonbearer's dietary rule appears to have been a matter of cultural discipline and personal choice rather than religiously based. Anyway, that was the first time I remember hearing the name. The second, well, I'll come to that.

On the first occasion, Moonbearer was accompanied by his wife, Lalitha. The second time he came alone. Though he dressed in standard American clothes, she wore a sari. I remember her as quiet, perhaps shy, though should mention also that—I didn't know then—she herself had a Master's degree and had been for a time headmistress of a school.

In contrast, Moonbearer radiated vitality. Well-mannered, alert, and quick. I remember him as tall and lean but will accept correction about the tall. His skin was dark as any African's, though his features suggested a different ancestry. This, I've learned since, had not protected him from the numerous indignities experienced by persons of that color in those days, most notably a bigoted administrator at his university, hotel reservations that mysteriously vanished, and the time during World War II a sentry at Aberdeen Proving Grounds made him wait while others were routinely passed through; he'd worked there on complex problems of ballistics, shock waves, and—strangely for that place of conven-

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tional weaponry—"transport problems related to neutron diffusion." Surprisingly, though invited and fabulously qualified, he never joined the Manhattan Project; crucially added to other difficulties, his security clearance came slow.

Regardless, I knew none of that at the time. Here he was. I saw a most impressive, outgoing man. I liked him. I think my sisters did. The term charisma comes to mind.

Of the conversation I remember little. Much, of course, would have been beyond my comprehension, though so far as I remember no profoundly technical matters were discussed. Among the names dropped, I think Sir Arthur Eddington was mentioned (about whom more later), though what was said has not stuck with me. I think Lalitha replied to a question about the education of women in India, saying merely that they were well educated; however true in her own case, I now suspect she suppressed some of Indian society's less attractive practices toward women, but let's not get into that.

My only remembered contribution to the talk came after Dad mentioned my interest in science fiction, to which I responded that, just lately, Moonbearer's name had turned up in a story I'd read. (George O. Smith's *Fire in the Heavens*, in *Startling Stories*, July, 1949.) Moonbearer was instantly interested, but I was unable quickly to find the relevant passage and Dad discouraged me from persisting. I suspect he was embarrassed by the Earle Bergey cover, typical of the time's pulp magazines. Quite understandable; Earle Bergey should have been embarrassed, it falling somewhere below his usual standard. My failure I regret, as it's evident to me now that George O. had done his homework and his reference to Moonbearer's work was correct. Moonbearer would have been pleased.

I would probably not have brought it up, though, had not Moonbearer told a few minutes earlier the one item I most clearly remember from that evening. A friend, he told us, but did not name, reported seeing him mentioned in a work of fiction. The name being distinctly his, and being of normal ego, he tracked down a copy; not without difficulty, I think he said, and I *think* remarked it was during the war. It was a mystery novel, he discovered. Not the sort of thing he normally stooped to. I'm very sure he gave neither author nor title, and I still don't know. Lowering his standards, he read far into it before, at last, he came to the passage where his name appeared. Preceding his name was the phrase, "as outrageous as the theories of."

One does not need a degree in astrophysics to appreciate that he'd been beautifully had.

So all right. At the time, I knew none of the context behind it; that's probably just as well. For approximately the next thirty years I went about my business and pretty much forgot. Never did take a course in astronomy, though one way or another picked up a layman's understanding. Though I understood Moonbearer was held in high regard, I knew almost nothing specific about his work in spite of the hint George O. provided. For sure, I did not know what theories the mystery writer considered outrageous, though over time I actually absorbed most of it (the reference should have been to just one) without any name attached.

That changed some time *circa* 1980 when a new issue of *Physics Today* came to my hands. It contained a historical article about which I'd previously had no clue and, by implication, explained how a writer of detective stories might come to deliver such a gratuitous harpoon.

I've since found it told several other places, always with the same essentials, which could be taken for confirmation were it not that some accounts clearly draw on ones published earlier—sec-

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ondary sources, as biographers would say—rather than independent fact gathering, just as I must admit this one is. Also, blessed with perfect hindsight, all focus on Moonbearer's point of view. This may present a distorted picture.

In the late summer of 1930, Moonbearer arrived in Cambridge, England for graduate study on a Government of India scholarship. He was then nineteen years old. In a photo from that period he appears terribly callow, but already he was beyond his years in mathematics and physics. As an undergraduate at Madras University he had produced several original papers, one of which saw publication in England's *Proceedings of the Royal Society*, no small accomplishment. In his baggage were drafts of two more, one composed just before leaving India, the other reporting further thoughts on the subject which he'd had while his ship steamed slowly westward. Those thoughts and the result of calculations based on them had him extremely puzzled.

He'd been thinking about the problem of white dwarf stars. In 1930, only a few were known, most notably the tiny companion to the bright star Sirius. That one, detected first by the effect of its gravity on the motion of Sirius itself against the background of more distant stars, was by then known to be extremely massive in spite of its small size. Further, its high "surface" temperature—spectroscopically determined—had been found similarly out of line. This combination made sense only if it was extremely dense as well as very hot, which made it profoundly different from every other type of star known.

For example, the most thoroughly studied star, our sun, has an average density less than one and a half grams per cubic centimeter while a similar volume for a typical white dwarf would be one million grams. That's a thousand kilograms or, in English units, more than a ton for just one of a pair of dice.

Note also, in both cases those are average densities. Deep in their cores the weight of surrounding matter compresses far more atoms into that same amount of space, resulting in much greater densities. The difference between a white dwarf and a normal star is that our sun generates energy by a thermonuclear process—fusing hydrogen nuclei into helium, for the most part—while in a white dwarf the core has been already converted into helium and/or heavier elements.

A star not generating new energy will, over time, radiate its energy into space, cool, and squeeze down upon itself by the force of its gravity. In stars more massive than the Sun, internal pressures may become sufficiently great that the helium will fuse into heavier elements; in the most massive stars, by stages, all the way up to and including iron. Fusion of elements heavier than iron, though, would absorb energy rather than liberate, with consequences I won't go into here. Nobody knew all that in 1930, so it plays no part in Moonbearer's tale.

In 1930, all that was known—perhaps I should say *suspected*—was that a white dwarf had to be a very strange star with a reduced or completely exhausted source of energy. British astronomer Arthur S. Eddington had suggested that, for their extreme density to be possible, the atoms in the core had to be completely stripped of their electrons. The result would be a chaotic melange of free electrons and equally disassociated nuclei, the separated particles being able to occupy much less space than if each nucleus had its own electrons in orbit around it. This condition was called a degenerate gas, a pejorative term which gets in the way of communication but, now, too late to change. Think of it as technical jargon, all normal connotations set aside.

The paper Moonbearer had completed before leaving India extended the calculations he'd seen in a paper by R.H. Fowler which, following up on Eddington's suggestion, applied aspects of

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quantum theory to conditions inside a white dwarf. Among Moonbearer's conclusions: the core of a white dwarf would be six times its average density. On shipboard, he found himself wondering if, under those conditions, relativistic effects would come into play.

Specifically, he was thinking of Pauli's exclusion principle, that no two electrons could occupy the same "quantum state." Under the conditions he'd calculated, the tightly crowded electrons would have to occupy all possible "energy levels" up to and including velocities near the speed of light. If such velocities were reached, he reasoned, shouldn't the rules of relativity also apply?

Working with the help of the few books in his luggage, he calculated further. Given sufficiently high densities, yes, some electrons would reach those speeds. Relativistic consequences would become significant. He tested for a variety of initial conditions, one of which would be the overall mass of the star involved. Something strange happened. For a star with mass greater than roughly one and a half times the mass of our sun, his equations solved to show its radius with a minus sign. Less than zero.

Er, uh . . .

What he had was a nonsense number. It implied that a more massive star—and many normal stars with greater mass were known—could not become a white dwarf if/when the energy source which kept it expanded drained dry. That begged the question, what would happen to a star of greater mass?

Moonbearer did not know. Neither did R.H. Fowler of Cambridge University, the same man who authored the paper Moonbearer had seen in India and who became, nominally at least, his mentor. When Moonbearer showed him the paper he'd drafted to report his peculiar result, the man admitted uncertainty. He would send it to E. A. Milne at Oxford, whom he thought more familiar with such matters. It developed that Milne, however, was convinced that all stars had degenerate cores regardless of mass and felt, therefore, that Moonbearer's reasoning was flawed. Some unidentified property of the extremely compressed, dense matter would become significant at some point, providing resistance to the gravitational pressure, and thus bring about a new equilibrium. Moonbearer should exert himself to discover this property.

Moonbearer knew of none, imagined none, and was personally satisfied he had used appropriate data and formulae. He believed his finding was worthy of publication whether correct or otherwise. Without the support of leading researchers in England, however, he had no hope of the Royal Astronomical Society's *Monthly Notices*, much less *Proceedings of the Royal Society* whose pages were open only to, or by endorsement from, members of that prestigious body. (His early paper in *Proceedings* had been as a "communication to" Fowler.)

With publication in Britain not possible, Moonbearer submitted it to the University of Chicago's *Astrophysical Journal* where, after some hesitation on the editor's part and clarification on his, it was published in the issue for March, 1931. How much attention it caught at the time I have no idea. Certainly Moonbearer's name would have been strange to American eyes, and the substance of the paper equally exotic. Also, he was still only a graduate student, just twenty years old.

(It's important to note here that publication of a scientific paper does not by itself establish a fact. Being a report from the very edge of what is known, many if not most will contain errors of measurement, observation, analysis, and/or argument. Such is even more true of papers which derive their conclusions from theoretical constructions rather than hard, lab-measured data.)

Meanwhile Moonbearer proceeded with his studies, attending lectures heavy with advanced mathematics and

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theoretical physics from such impressive names as Fowler and Eddington, but also Paul Dirac, who taught quantum mechanics and who became Moonbearer's official advisor for a term when Fowler went on sabbatical. Unlike Fowler, difficult to approach, the younger Dirac was open and friendly, though not much for small talk. They visited back and forth, and took long walks together on the old Roman road. Already, Dirac had published the paper that would win for him a Nobel Prize two years later, though neither could have known that then.

When, in the spring of 1931, Moonbearer won election to the "Sheep Shanks Exhibition" for his research in astrophysics he received an invitation to meet Sir Arthur S. Eddington personally, something he would not have dared to do on his own. Knighted the previous year, Eddington was then the preeminent British astronomer in a constellation of giants. Already well known within the profession and an early champion of Einstein's General Theory of Relativity, he had directed observations of a slar eclipse in 1919 which provided the first confirming evidence for that theory. At about the same time, struggling to explain the source of energy that enabled stars to burn for millions of years, he proposed among other possibilities the conversion of hydrogen into helium, the difference in mass between four hydrogen nuclei and one of helium being released as energy according to the now famous Einstein equation—this at a time when no process by which such transmutation could happen was known. A further difficulty with the idea was that, in 1920, it seemed doubtful that stars contained enough hydrogen to produce the necessary energy regardless of the details; though the process remained a mystery and Eddington gravitated toward other explanations, that particular objection was set aside by Mrs. G.

In addition to being a man of broad knowledge and stimulating ideas, Eddington was a skilled communicator, not only to fellow scientists but to the general public through both books and lectures. His *The Mathematical Theory of Relativity* (1923) was the first book in English to comprehensively explain relativity; Einstein himself considered it among the best. He summarized his research into the physical conditions inside stars in *The Internal Constitution of the Stars* (1926), a landmark in the emergence of astrophysics as a separate discipline. When, while still in India, Moonbearer won an essay contest, the prize for which would be the book of his choice, that book was the one he chose and one of the three he had with him when he sailed for England. He revered Eddington above all others.

Sometimes it is even said that Eddington was Moonbearer's mentor. While at one point, which we'll come to, they worked closely (though perhaps at cross purposes), in formal terms he was Fowler's student. Fowler, however, was a busy man with many students and for the most part stayed remote. On Moonbearer's side, beginning in his native India, he had many teachers, himself not the least. He first learned quantum mechanics, it's reported, by study of the original papers. From the one detailed account I've found of his time at Cambridge, I infer that if anyone served as a true guide it was the physicist Dirac, rather than an astronomer, but it also must be said that, studious and diligent, Moonbearer found his own way, supplementing his Cambridge studies with a summer in Göttingen, Germany (nominally under Max Born) and, later, a year in Copenhagen at the fabled Institute for Theoretical Physics of Neils Bohr.

Copenhagen, however, proved something of a disappointment. Though his original goal had been mathematics or physics, his early work on white dwarfs made him appear an astrophysicist which, in Bohr's view, was a separate and perhaps less than respectable sub-

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ject. Though he attempted while there to work on a purely physical problem proposed by Dirac, and thought he had solved it, Dirac found an error and he abandoned the effort. He was also something of an outsider socially; though he made several friends among his fellow students, Bohr's attention was mostly elsewhere. At Sunday afternoon teas in Bohr's home, Bohr would often invite other students up to his study for, presumably, profound discussions. Moonbearer was left alone with Bohr's son Aage, then only ten or eleven years old.

But during his stay in Copenhagen, Moonbearer mentioned his strange conclusion about white dwarfs to Leon Rosenfeld. A physicist thoroughly schooled in quantum theory rather than a dabbling astronomer, and without preconceptions on the matter, Rosenfeld urged him to publish a more complete report than his initial short note in what was then an obscure—to European physicists, anyhow—American publication. Encouraged, having learned much in the two years between, and bearing in mind Milne's criticism, Moonbearer presented his calculations and stated his conclusion cautiously, that for a star more than 1.2 times the critical mass (1.5 solar mass), quantum theory as it then existed offered no counterforce to prevent the star from contracting upon itself indefinitely. As a question raised by this conclusion, he left open the fate of larger masses. Then, aware that Milne would almost certainly be consulted if he offered it for British publication, he submitted it to *Zeitschrift für Astrophysik* in Germany, whose editor he'd met at Potsdam Observatory after his summer at Göttingen. What he failed to anticipate was that Milne, then visiting Berlin, would be asked to review the submission. Back to square one.

By then the two were well known to each other. They had corresponded, conferred, and had even collaborated—at Milne's invitation—on at least one paper. On some matters they agreed, on others not. To this new paper Milne's response was essentially the same as to the earlier one. Moonbearer, he said, had made a fundamental mistake. Further, he warned, to persist with this idea would seriously damage his professional reputation. Moonbearer replied most stubbornly, and with reluctance Milne gave consent to publication in spite of personal doubts.

There again the matter rested. His scholarship running out, he had to complete his doctorate and see to establishing a career. Still in Copenhagen, with little or no guidance from Bohr's circle he composed a set of four papers on a subject only marginally related, if that, to his white dwarf work: "distorted polytropes." These would be his thesis. Returning to England he defended them before a committee of two, Fowler and Eddington, a formidable pair, but the interview was perfunctory. So far, so good.

Newly anointed, Moonbearer was further honored to be elected a Fellow of Trinity College. Though he'd applied, he had not expected this to happen. Only one man from India had previously won such recognition, the mathematical genius Srinivasa Ramanujan, whose fame in India had been to him an early inspiration. Among the benefits, it provided free lodging in the college, high table dining privileges, and an allowance of 300 pounds a year for three years. (Today that sum would be a pittance; then it was real money.) His immediate future was secure.

As a Trinity Fellow, Moonbearer qualified for membership in the Royal Astronomical Society. Already he'd attended several of its monthly London meetings as a guest of either Fowler or Milne. In fact he'd presented the substance of his thesis material there as a paper prior to the formal defense, both of his inquisitors-to-be among those present. Now, nominated by Milne, he became a Fellow of the society (F.R.A.S.) in his own right. As for Trinity's high table, that put

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him in the orbit not only of Dirac, Fowler, and Eddington, but also such names still recognized today as physicist Ernest Rutherford, mathematician G.H. Hardy, and J.J. Thomson—by then Master of Trinity but who, just before the turn of the century, had discovered the electron. Definitely coming up in the world.

One purpose of the fellowship was to allow Trinity's best and brightest time to do work that would establish their permanent reputations. Not until the fall of 1934, though, did Moonbearer again address himself to white dwarfs. That was after a tour of Soviet Russia, then in idealistic full flower where it was just beginning to be noticed that, as Orwell put it, some pigs were more equal than others. Stalin's Great Terror lay still in the future.

While visiting Pulkovo Observatory near Leningrad, he gave two lectures—most probably in German—one of which dealt with his work on white dwarfs. One of the young astronomers there, Viktor Ambartsumian, pointed out that he could produce a more convincing argument by eliminating the approximations he had used to simplify the calculations; essentially, to refine back-of-envelope computations into a rigorous, all-cases proof. Easy to say, more difficult to do.

Ambartsumian's comment stuck. Perhaps with that he could persuade these obtuse Englishmen. In the fall of '34, Moonbearer set himself to the task.

It took three or four months, up to twelve hours a day. Each aspect of the proposition had to be nailed down. It required construction of a graph, each point of which had to be laboriously calculated. In those days "computer" meant "drudge in the back room." Moonbearer did it all himself.

Eddington took an interest. He had welcomed Fowler's application of quantum theory to the concept of degenerate gas because it supported his belief that stars, even white dwarfs, behaved throughout according to the laws of gasses. In this he was in rivalry with Milne, who insisted all stars—not just white dwarfs—had degenerate cores regardless of mass or other conditions. Eddington apparently thought Moonbearer's work would show Milne's position to be untenable. Left aside was that it also would mean no star significantly more massive than our sun could become a white dwarf, contrary to the belief Eddington held that a white dwarf was the exhausted fate of every star; on that point Eddington seems to have hoped Moonbearer would discover some miscalculation, misapplication of principles, or other flaw in his reasoning. He may not have realized how close it would bring him to the position Milne had taken.

All of this may sound suspiciously like Swift's war between little enders and big enders, but out of just such quibbles can come profound discovery. What we have is a small group of brilliant, stubbornly contentious men each groping toward a truth whose form none could anticipate.

Whatever his motives, Eddington visited Moonbearer frequently while the young man labored, sometimes several times a week, keeping track of progress. He arranged for Moonbearer the loan of a hand-cranked calculating machine, the only one in sight, much to the displeasure of a visiting Norwegian who had been using it. He saw the data points accumulate, the curve extend and ultimately break. When the work was complete, a white dwarf of more than critical mass still not possible, Eddington on his own initiative arranged for Moonbearer to be allotted a full half hour, rather than the standard fifteen minutes, to present his findings at a Royal Astronomical Society meeting. The only hint that all was not well was that, receiving an advance copy of the program, Moonbearer noticed Eddington had a paper on "Relativistic Degeneracy" scheduled to come after his own. This would be

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contrary to the usual custom by which the great luminaries—the like of Milne, Fowler, Sir James Jeans, Eddington himself—would present their work first while lesser beings would come later. When, in Moonbearer's presence, someone asked Eddington what he planned to say, the man turned to Moonbearer and said merely, "That's a surprise for you."

Indeed it was. On the second Friday of January, 1935, the society gathered. When Moonbearer had spoken and Eddington replaced him at the front of the room, it was to point out that for masses of increasing size, unless they possessed some counterforce to resist the force of their own gravity, they would squeeze themselves smaller and smaller indefinitely. As the matter became more concentrated, the gravitational field would become more and more powerful until not even light could escape. This, he said, was absurd. Therefore, he argued, some law of nature must exist to prevent it from happening.

The fundamental concept here has been traced back to the late eighteenth century. Light was thought then to consist of "corpuscles" which, like every other substance, had mass and were therefore subject to gravity. Even then, though, it had been offered as a curious idea with, at best, dubious reality. When light was found to be without mass, the idea could be discarded. Then Einstein published his General Theory in 1915. Soon after, Karl Schwarzchild showed that, were Einstein correct, a sufficiently powerful gravity field would warp the surrounding space to such a degree that light would be turned back on itself. Same idea, just a different mechanism.

Even then, though, it was just a curious concept involving extreme conditions which no one imagined might exist. Until Eddington applied it to Moonbearer's finding, that is, and Eddington was using it as an argument to show that Moonbearer could not possibly be correct.

Eddington went on to say that, in his view of the Cosmic All, relativistic degeneracy was nonsense and that to apply quantum theory in tandem with relativity was "unholy wedlock" He apparently chose to ignore that, even at that early date, correspondences had been found between the two theories, and that other combinations had produced fruitful results.

In all their discussions prior to that evening, Eddington had never raised these objections. Now, though without specifics, he was saying—like Milne—that Moonbearer must have made a fundamental error. The painstaking structure was brought down and Moonbearer made to appear a schoolboy fool.

The immediate impact of this ambush was devastating. The society's president, presiding, made a neutral comment—careful thought should be taken before conclusions arrived at—and called for the next speaker, thus forestalling debate. The consequence was that no one stood forth in Moonbearer's defense, but even had that been permitted, the result would probably have been the same. Asked to choose between the opinion of a man of Eddington's stature and the elaborate construction of a young man from a distant nation ruled by their own, and which involved concepts which many understood but dimly, the assembled members would have seen it as no contest. Eddington had to be right.

Milne, among those present, was jubilant. By his understanding, Eddington had shown Moonbearer's finding incorrect; therefore his own idea that all stars had degenerate cores had to be true. Logically, one does not automatically follow from the other; to eliminate an alternative does not confirm a competing theory. Neither does it invalidate possibilities not imagined, though to postulate an unknown has hazards also. Milne's contention that some unspecified process empowered a more massive

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body to resist compression, which Eddington had seemed to embrace, was an equally shaky limb to be out on.

The matter did not end there. In public lectures, in private (including discussions with Moonbearer), in journal publications, and at scientific meetings, Eddington continued to condemn this strange idea. It bothered him. His understanding of the nature of stars was challenged; therefore it had to be false.

Equally distressed, profoundly conscious that in spite of care he might have made some mistake, Moonbearer wrote to Rosenfeld in Copenhagen, sending a summary of his work and asking that it be checked in detail, if possible by Bohr himself. Correspondence fluttered back and forth. Bohr did see the summary and found no error. However, he declined to involve himself publicly. (Since these astrophysicists didn't know how stars got their energy, all other discussion was speculative.) In discussion with Eddington, Moonbearer found that Eddington's understanding of Pauli's exclusion principle differed from the standard; this was communicated up the grapevine to Pauli himself, who replied that Eddington was talking nonsense but also declined to get involved. The attitude among continental physicists seems to have been to keep aloof from what they saw as a squabble among British astrophysicists. Astrophysics, in their view, was not really physics. The atom, waves, and fields of force—then the focus of their studies—was remote from such colossal aggregations of matter as stars. A sort of intellectual provincialism prevailed.

That Eddington was a skilled communicator, able to construct facile arguments and defend his positions with a jest or a twist of rhetoric, may also have persuaded them to keep low profile.

All of which helped Moonbearer not at all. Neither was he helped when, at a meeting of astronomers in Paris, July 1935, Eddington spent a large portion of an hour-long talk in condemnation of Moonbearer's theory. Obeying protocol, Moonbearer sent a note to Henry Norris Russell, presiding, saying he would like to reply. The note came back: "I prefer you don't." This was hardly fair, and it puzzles. Earlier, privately, Russell had confided to Moonbearer, "Out there we don't believe in Eddington." Exactly what was going on I leave for sociologists who study how the community of science functions to explain.

In effect, Moonbearer was defeated. While physicists found no fault with his work but held back from saying so, Eddington's judgement prevailed among the British astrophysicists, where it really counted. The consequence was that, though none questioned his brilliance or his ability as lecturer and teacher, no academic position was available. A few administrative posts in India were offered, but his goals did not lie in that direction. Similarly he had to turn down a position at the institute run by his uncle, a physicist of international reputation; besides the odor of nepotism, all too strong in Indian society, the relationship could be awkward and the institute was devoted to experimental work. Not his game.

So he took the only choice left him: he gave it up. He abandoned further research into white dwarfs which he'd planned. He put what he'd learned so far into a book, let it go, and turned attention to other questions. He accepted an invitation from Harlow Shapley to lecture at Harvard. While there, he received an offer from Otto Struve, for a research associate position at Yerkes Observatory which, though located in southern Wisconsin, was the astronomical department of the prestigious University of Chicago. (Notice, by the way, how the same names keep turning up.) At the time, Struve had been commissioned to upgrade the department by addition of new, young faculty. I've seen it stated that neither Moonbearer nor the other new hire, Bengt Strommgren, were his first choices, though no other

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names were mentioned.

One final confrontation with Eddington took place at a conference in Paris, July 1939, Henry Norris Russell again presiding. (Among the other participants, I discover, both Sergei and Mrs. G.) Moonbearer presented a paper one day, taking into account recent discoveries in nuclear physics and suggesting a link between stars of more than his critical mass and such cataclysmic stars as novae and supernovae. (Tentative then, but now accepted as correct with the addition of much technical embellishment.) Eddington spoke the following, concluding day. If anything, his judgement had hardened; now he doubted Fowler's formulation which had put the concept of degenerate gas on a strong foundation. Fowler was a mathematician, he said; he didn't know physics. Moonbearer challenged. He, I think it's safe to say, knew far more about recent developments in physics than did Eddington. It went back and forth, neither budged, and finally Russell terminated the discussion. Between the two, nothing had been settled.

One further, very curious aspect of the affair: throughout they remained on friendly terms. In the spring of 1935, while one might imagine their disagreement would poison all but the coldest of exchanges, they went on a bicycle tour together. Moonbearer attended a Wimbledon match as Eddington's guest (though they rooted for opposing players). Both, it seems, separated their scientific convictions from their personal relationship. The respect and regard they had for each other was maintained as if between sportsmen who, from time to time, might play against each other. Though they did not meet again after the 1939 conference—World War II intervened—they continued to correspond about both technical and personal matters; Eddington's last letter was written less than two weeks before he died, unexpectedly, in the fall of 1944. As the letter mentioned he would go into hospital that evening, quite possibly it was the last letter he wrote to anyone. Moonbearer delivered a eulogy at the University of Chicago, the text of which appeared in the *Astrophysical Journal*. A quotation from it which I've seen positively glows from the page.

Moonbearer's book was published in 1939, whether before or after the Paris conference I do not know. By then, his research was looking into other problems.

And some time between 1935 and 1949 a mystery novel was published which echoed Eddington's condemnations in a throwaway line. A mischievous friend informed Moonbearer of its existence without giving details. Investigating, as the friend must have known he would, there it was all over again: "outrageous as the theories of".

In 1949 he told of that as a dinner guest with, so far as this unknowing kid could tell, nothing but sublime amusement.

Decades later, when I discovered what lay behind that bit of humor, my first thought was: Sheezuss! And he could joke about it!

On reflection, though, I began to understand. He'd had nearly fifteen years for the immediate pain to subside and to develop perspective. He had a lively sense of humor and could enjoy a joke on himself. Also, in private surroundings, he had a friendly audience. Even more significant, though, both his personal situation and the status of his theory had changed for the better.

His position at Yerkes Observatory was secure. In fact, at about the time he told this joke, he had either already or was about to assume directorship of both Yerkes and MacDonald Observatories (at the time the two being jointly administered), though that was to be only a caretaker appointment of short duration. He had completed other research projects with which both he and the scientific community were well satisfied.

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His reputation as a teacher was attracting first-class students. Perhaps most satisfying, in 1944 he had been elected a Fellow of the Royal Society of London, Britain's most prestigious scientific association, equivalent to the National Academy of Science in the U.S., which is modeled after it. Eddington was reported to have favored his candidacy, and it was the impossible dream of every working scientist in his native India.

As for his theory, though outside the range of most astronomers, it had never been as controversial in the U.S. (When, some days after, I found and told Dad the essence of George O's reference, Dad replied merely, "Oh, that's well known.") Also, mystery writers to the contrary, partial confirmation had come. In early 1939, working with students at the University of California, Berkeley, J. Robert Oppenheimer published a pair of studies. With George M. Volkoff he showed that for masses somewhat greater than Moonbearer's critical mass, one further state of matter could resist the gravitational pressure; the free electrons would combine with nuclear protons to form a substance which might, for lack of a better term, be called neutronium. Today, of course, we would call such a body a neutron star. Almost simultaneously, with Hartland Snyder, Oppenheimer showed that a sufficiently large mass would implode down to a point enclosed by an event horizon like a snake devouring its tail until nothing remained. Conclusion: Milne had been sort of right—something more did resist—but only for an intermediate mass. Eddington had also been right; for greater masses everything would go just as he said, except it wasn't absurd. I infer Moonbearer knew of this work prior to the Paris conference.

Understanding of what goes on inside a star, and how that affects its external properties, had also improved. In 1938 Hans Bethe figured out the thermonuclear processes which produce the energy, not only for our own sun but also much larger stars; Bohr's objection could be set aside. (At first Bethe thought a cycle dominated which combined free hydrogen nuclei—protons—with carbon to produce in a series of reactions nitrogen, oxygen, and helium, plus as much carbon as initially consumed. With later work it was found that while this process operates in more massive stars, our own sun produces energy by a process Bethe also described: fusion of hydrogen into deuterium, tritium, and ultimately helium. On this point Eddington's old conjecture had been right; he should have stuck to it, but neither he nor anyone else had known enough so long ago.)

Though I'm unsure how much of what follows was known, suspected, or guessed at in 1949, for Moonbearer's theory, what's significant is that in the course of a star's life, the time will come when most of the hydrogen in its core has been converted into helium and the zone in which fusion continues will gradually migrate outward as an expanding shell. With the energy being generated progressively nearer to the star's surface, the outermost part of the star will expand and "boil off" a progressively increasing fraction of its mass until the pressure of what remains is insufficient to keep the thermonuclear process going. Thus many stars beginning their lives more massive than the Sun—up to about eight solar masses is the current estimate—would come to termination comfortably below Moonbearer's critical mass. What remained—essentially the denuded core—would be a white dwarf. Since our sun is a star of roughly average mass and the number of stars more massive drops off sharply as the bar is raised, this would mean the great majority of stars end up as white dwarfs. Eddington, were he still around, could relax a little.

For the precursor of a neutron star, a mass up to roughly twenty solar masses seems generally accepted, though I infer it's a highly uncertain estimate since the maximum mass for a body of pure neu-

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tronium—beyond which a neutron at the center could not resist the weight of all those other neutrons pressing down on it—is imperfectly known. Not that, in 1949, so much as one neutron star was known to actually exist. The first was discovered as a pulsar in 1967 and quickly identified as a rapidly rotating neutron star after its announcement early the following year.

As for stars too massive to become neutron stars, though a number were known in 1949—S Doradus, for one—their fate remained indefinite. All we had was Oppenheimer's work and Eddington's earlier cry of pain. Now we know more, or at least think we do.

Today we'd say Black Hole, and what's so weird about that?

Well, in 1935 it was weird. It took some getting used to, and it still feels weird. What might be called Eddington's Haldane Index (the Universe is more strange than we can imagine) had been exceeded. To this day, not one black hole has been seen directly, and by the nature of the beast it's safe to say none ever shall. Their real existence, though, is not doubted. It's generally suspected that most large galaxies, our own included, have at least one at or near their center; several, in other galaxies, have been detected by the velocity of stars near the centers which orbit them. Enclosing millions of solar masses (and lately I've seen the dreaded word *billions* used), black holes of this type are usually described as supermassive to differentiate from the ordinary-sized black holes of, say, five or ten solar masses which are remnants of supernova explosions. Only the latter, of course, would result from the process Moonbearer's work hinted at, though subsequent merger of many "ordinaries" might make a supermassive one. That, though, is pure speculation.

Lately, also, evidence of an intermediate black hole of a few hundred solar masses has been reported.

Black holes are also the explanation of choice for numerous other exotic phenomena. Quasars began to make sense only when the suggestion came that their prodigious energy output came from collisions of fast-moving matter as it whirlpooled into black holes in the cores of galaxies so distant that the light of all their stars together can barely be detected. Seyfert galaxies—galaxies with an abnormally high energy output, but less energetic than quasars and observable as otherwise commonplace galaxies—became merely a less energetic class of quasar. The luminous, radio bright jets seen driving from the centers of some galaxies are thought to be produced by matter orbiting a black hole which, spiralling inward (same as for a quasar), has had a portion diverted by random motion collisions in the "accretion disc" (think Saturn-type ring) and escaping in the directions where opposing pressures are least, perpendicular to the plane of the disc. Most recently, the phenomena known as gamma ray bursters—extremely short-lived, preposterously energetic pulses of gamma radiation from extragalactic space, almost never twice from the same place in our sky—have been explained as the blast of radiation released in the instant a black hole forms (by stellar implosion, a type II supernova event, or perhaps the merger of two neutron stars) somewhere far, far away, narrowly beamed toward us either by asymmetry inherent to the event or by the suddenly intensified magnetic field of the imploding object. This would imply that many similar events happen which point their beams some other direction. Since gamma ray bursters are detected at the rate of roughly one per day, even allowing significant dispersion to the beam, that means . . . well, you figure it out and decide if it makes sense.

In 1949, neutron stars and black holes—the latter term not coined until 1967—were merely theoretical concepts, logical consequences of known

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physics but not known to actually exist. However, if they didn't or—worse yet—couldn't, some very serious questions would have had to be asked about "known" physics. Meanwhile, I don't know just when or by whom—it might have been Moonbearer himself—another paradoxical consequence had been noticed: that for a body without a source of energy, the maximum size regardless of mass is roughly the diameter of the planet Jupiter. More mass and the matter in its core will be forced into a degenerate state and it will squeeze down to a smaller size. (It's this point that George O. Smith focused on in his story; odd, in that his central idea was capture of the energy emitted by the Sun in the form of neutrinos. Uh-huh. Whoever figures how to do that will make a fortune.)

For example, a white dwarf the mass of our sun—nominally 1,000 joves—would be more nearly the size of our own planet. A neutron star, which is not degenerate but even more compact, is usually described as about ten miles side to side. Note, by the way, that's very approximate; for nature to produce by sheer chance such a neat, round number of an arbitrary unit of measure should rouse every serious thinker to the utter height of disbelief. More likely the guy with the measuring stick has ballparked it. The same, by the way, applies also to Moonbearer's 1.5 solar mass figure. Later, more precise calculations (using more precise data, I'd presume) have slightly reduced it to "about" 1.4. Some sources give it as 1.44, though how much more reliable the added decimal makes it may be an illusory precision. One recent book full of mathematical hieroglyphics says 1.46 and implies that the exact mix of atomic nuclei started with determines the precise number for each star. About 1.4 is close enough.

Regardless, I see it stated nowadays that no white dwarf whose mass can be measured has been found with mass greater than 1.4. One textbook from the '50's mentions a white dwarf estimated at 2.8 solar masses and claims there are none "with masses over 3.5 times the sun's"; I presume these represent mismeasurements or stars misidentified as white dwarfs. Similarly, I've seen it remarked that most neutron stars tend to cluster around 1.35 solar masses. Some discrepancy here, which may be simply a problem of measurement or possibly having to do with the speed and sequential process of their formation. Perhaps, also, mass is lost after they form, though exactly how that could happen might be hard to explain.

One other recent development which might raise doubts needs mention. Since 1995 a number of planets orbiting other stars have been detected. In late '99 came announcement that one, already known, had been "observed" as it passed in front of its star. By "observed," though, I mean the reduction in the starlight reaching us, caused by the planet blocking a small portion of the star's disc, had been measured. Analyzing the data, the observers concluded that the planet was roughly 30 percent larger than Jupiter in spite of being only two thirds Jupiter's mass, which would seem to contradict the claim that Jupiter is as large as a non-selfenergized body can be.

The newsnotes I've seen fail to mention whether special circumstances might apply, such as the possibility the planet might have a Saturn-like ring, thus magnifying its apparent size without addition of significant mass. (Not likely; the planet orbits excruciatingly close to its star. Tidal forces would disrupt a ring.) Or it might be a newly formed world still in the process of gravitational contraction. (Also improbable; I gather it's not a star recently formed and therefore the planet likewise if current theories of planetary formation are correct.) The newsnotes do mention a more obvious explanation: so close to its star that it completes an orbit in only three and a half days (well, to be precise, 3.5243 days) a gas-giant world, which this is presumed to be, would be

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powerfully heated by its star and therefore maintained in an expanded condition.

As I've said, Moonbearer did not name the mystery novel or who wrote it. Neither did he identify the friend who told him about it. That the writer must have had Eddington's tirades in mind, however, should be obvious.

From the writer's point of view it was a nearly perfect line. To a reader who knew of the controversy the allusion would immediately make sense. For one who did not, Moonbearer's exotic name would instantly imply that, whatever the theory or theories might be, it was "far eastern claptrap." Never having identified the book, however, I don't know if the line appears as simple exposition, comment by first-person narrator, or perhaps some character's dialogue. If the latter case, it could even be a character based on Eddington. Neither have I information as to context, though more than a few mystery stories will present, if only to reject, theorizations of howling absurdity.

As for how knowledge came to the writer, the possibilities are numerous and unimportant. Somehow he or she had learned of the controversy and, needing an easily understood, vivid hyperbole, made efficient use. For what they're worth, however, I do have a few speculations.

The book would have to have been written and published between 1935 and 1949. As the controversy was mostly on that side of the Atlantic, more likely it was a British writer than American. Whether a well-known writer or one completely obscure I have no way to know, though a major writer's work would have had greater probability of coming to the friend's attention.

But in reading about the affair, I do come upon a provocative bit of fact. While I haven't sought out a full-scale biography of the man, a personality portrait of Eddington mentions that, for relaxation, he read mystery stories. Another source implies he was not above indulging in jests aimed at rivals which could be characterized as snide, which may account for the theatrical way he blindsided Moonbearer. It's very tempting, therefore, to suggest he was the friend Moonbearer did not name, but it's equally possible it was someone whose name would have meant nothing to us.

Were I telling this tale as fiction, though—I'm not, but I do not promise to resist temptation should the right setup come along—I'd take it a notch or two farther. Not only would my Eddington surrogate be the friend, he would have connived with the writer to have the line worked into the story, after which he would send Moonbearer off on what amounted to a snipe hunt. That, however, is too neatly structured for the real world.

But I do know of at least two British academics (in literature studies, though, not science), active within those fifteen years, who wrote mysteries on the side. Likely there were others. For that matter, Agatha Christie's second husband was archaeologist Max Mallowan, which would have brought her into academic circles. Whatever, within British academic society there were a number of possible contacts, nor is it imperative for the writer to have been an academic for Eddington to have conspired. For all I know, it could have been Eddington himself under a pseudonym never revealed.

Wild speculations, these. Doubt them.

So what should we make of this affair? Actually, not a whole lot. The history of science is cluttered with occasions most neatly summarized as Young Squirt squashed by Old Guard who already Know All. As a science-fiction plot, Hugo Gernsback must have grown weary of it, though with serial numbers removed, new hubcaps, and a paint job it can still be smuggled past the most

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alert of editors. George O. Smith's story included it among its tropes. I've done it myself.

But keeping to the historical record, we know about (some of) the times the Old Guard was full of bananas. Galileo, I need merely drop the name, though I should add his difficulties were with Church authorities, not fellow scientists; but since science was then evolving out of "natural philosophy," the study of God's creation, we can quibble that it's a distinction without a difference. Mrs. G's experience I've already mentioned. Otherwise, we have geologist J. Harlen Bretz, who saw traces of a catastrophic flood in the channelled scablands of eastern Washington; as this ran against prevailing doctrine he was roundly ignored for over twenty years. The earliest discovery of Neanderthal bones was dismissed as the skeleton of an obviously subhuman Cossack (in the judgement of most Europeans, there was no other kind) from the Napoleonic wars. Similarly, while the Piltdown forgeries gave British egos something to crow about, Raymond Dart's reports of australopithecine fossils from South Africa failed to fit preconceived notions of human evolution and were not taken seriously. Arthur C. Clarke neatly described the pattern of all such events in his First Law.

Less often do tales survive of the times the Old Guard had it right, but look up Lysenko, N-rays, and polywater. Cold fusion? I'm personally skeptical, but concede the coffin may not yet be nailed shut. Some arguments why it can't be happening sound equally false to my ears.

The thing is, in scientific enterprise doubt and skepticism are a necessary part of the process. Taken uncritically, new ideas and/or conclusions drawn from experiments which may or may not have been well constructed, weaken the overall structure of knowledge rather than give strength. A highway bridge must be built with materials of known durability and the engineers must take care not to misplace a decimal point. The same applies even more crucially to aircraft and prescription medicines. Scientific knowledge, similarly, must be constructed of reliable parts reliably assembled.

So the wise worker in science, confronted by a new idea or reports of new phenomena, will, at minimum, back off and reserve judgement. Just because it "sounds right" or because its advocate speaks with silver tongue does not establish a truth. If, upon reflection, it's consistent with everything else he knows, he will begin to take it seriously. If something he "knows" ain't so, trouble starts.

At that point the impulse is to reject the new information. Ideally, he will resist the impulse long enough to consider the possibility that something he believes true is, in fact, not. Similarly, he should consider that the apparent contradiction may be, actually, nonexistent. The ideal, however, does not always happen. Thought is not always icily logical, faulty knowledge frequently fits into patterns with other so-called facts, and some minds are more flexible than others. Unless the new information is outrageously false (but how can we know that?), doubt rather than outright rejection is usually the most prudent course. But the doubt also needs to be doubted.

Also needed but not always present is a healthy dose of humility. It's tempting to believe you know and understand everything. Also dumb. The Universe is full of surprises, even for one who has immersed himself in an area of expertise for over twenty years. The truly wise scientist knows this. Confronted with some new development, he will point out how it conflicts with other known "facts" or, if he knows of none, will either keep mouth shut or comment in qualified terms. Let some less cautious colleague tempt the gods. Journalists—and, for that matter, historians who pick up the pieces—tend to prefer contro-

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versy over sheeplike unanimity and quick, unequivocal statements rather than the carefully measured one step forward, seven-eighths back. What survives, therefore, is more likely the colorful, snappy response than the judicious and ambivalent. Galileo probably did not mutter, "Nevertheless, it moves." The earliest surviving reference comes from fifty years after the event. More recently, to his later embarrassment, a newly appointed Astronomer Royal, Richard Woolley, was reported to have told the press, "Space travel is utter bilge." That he was travel-weary at the time somehow failed to get equal coverage, and in one book—unfortunately one I judge less than reliable—I find him quoted: "All this talk about space travel is utter bilge, really," which both alters the thrust of his statement and presents a much more professorial stance. An antidote for sound bite may be required.

The truly gifted learn to parry with lines both quotable and noncommittal, such as one I saw from a theoretician not entirely unknown to science fiction who, asked to comment on recent developments in the arcane realm of string theory, responded: "At my age, one tends to emit a lot of gas. I'd rather not."

If, however, the new development lies in an area the scientist regards as home turf, choices are more limited. Especially if he is The Authority, to whom all but a few scattered mavericks defer, keeping silent would lend credence which is not merited. If he has specific objections he may publish a paper, a letter, or "technical comment" in reply. If it's an inspecific "gut feel" such as seems to have been the root of Eddington's objections, he may limit his response to less formal comments privately to colleagues, in correspondence, at conferences, or—nowadays—via the ubiquitous internet. Others may weigh into the discussion on either side (or however many sides there be). Confusion may reign for a while. Ultimately, though it may take years, some sort of consensus will be reached. Other new developments may produce support or take it away. Other, better proposals may come forth to render the question moot.

But leadership imposes responsibility. Out of deference, the British astronomical community followed Eddington's lead without careful examination of his arguments. Many probably lacked the grasp of principles to take part or even to judge the debate, but asked to choose between Eddington's articulate, colorful rebuttal and the proposition offered by this young man in terms they had to strain to understand, Eddington's opinion could hardly fail to carry the crowd. Eddington may not have realized this. His rivalry with Milne and, earlier, with Sir James Jeans were legendary and had been a source of entertainment without any clear-cut resolution. Here, though, he was picking on someone not his own size.

Yet, that is.

The first critic of a new observation or idea is the scientist himself. He, with his team if he has one, will do his damnable best to shoot it down. The idea will have flaws. (Dirac's mathematics implied that the electron could have either a negative or a positive charge, an obvious absurdity; then the positron was discovered.) The reported phenomenon is poorly described or merely misinterprets something normally well understood. (See UFO reports. Elvis sightings. Which is more plausible, gunshot echoes or a second sniper on the grassy knoll?) The experiment's result does not rule out alternative possibilities. (Not long ago but before the current flood of reports about planets circling other stars, a radio astronomer announced a planet orbiting a pulsar, a distinctly odd place to find one. Preparing for a conference he redid his computations. This time—just to be sure—he incorporated a factor previously thought insignificant and the planet, in effect, disappeared. To his credit, he went before a thousand of his peers, ad-

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mitted his mistake, and was surprised by the thunderous ovation delivered by colleagues who must themselves have known how very easy it is to go terribly wrong.)

If the new development survives in-house challenge, but only then, the next step is to publish. Most scientific journals will privately pass submitted papers to other workers in a given specialty for comment and advice, just as the German journal's editor asked for Milne's opinion on Moonbearer's paper. Much bad work—but some good, also—is rejected at that point, some ultimately to find publication in less cautious journals. Publication, though, does not automatically establish New Truth. For example, some years back analysis turned up amino acids in a meteorite which had lain in a museum's collection for something like a century. The presence of these compounds was factual and not questioned; unanswered—and not possible to answer at such late date—was whether the acids might have got into the meteorite after it hit the ground. Evidence of amino acids in primordial space, or just contamination? Spoilsports considered it interesting that the most abundant amino was also the most abundant in human fingerprints.

Taken by itself, no larger fact could be concluded. What could be done was haul into the lab meteorites more recently come down. Yesterday or sooner, please, with witness documentation if possible. This has been done, and amino acids have been found, but that initial discovery must still be considered dubious.

In short, nail down details. Split hairs and eliminate alternatives. Only if the concept comes through all such tests should it be taken seriously.

That point has a corollary: unless utterly convincing from the outset—and even Darwin's natural selection failed that test—a concept or a set of observations that goes unchallenged occupies a sort of limbo. Its truth or falsity stands indefinite as the life of Schrödinger's cat. Thus the neutrino, postulated on theoretical grounds, existed only as a fudge factor in the minds of particle physicists for something like a quarter century before, finally, experiment proved it was real. But had its nonexistence been proved instead, much else they thought true would have been shown false. This lack of proof made them very uneasy.

In the case of Moonbearer's theory, Eddington felt it went against common sense, and no laboratory in the world, then or now, could test the behavior of matter under the conditions being dealt with. On the other hand, Eddington's objections failed to show where Moonbearer had gone wrong—the consensus now is that he hadn't—but to pinpoint a mistake isn't needed if it can be shown the answer is wrong. Eddington thought he was doing that and it can be argued that he merely reinforced the natural doubt which Moonbearer's strange idea called for.

We need to remember also that both relativity and quantum theory were, then, comparatively recent, controversial, and—each to the other—philosophically antithetical. While relativity saw the Universe as deterministic—this force produces that effect, no ambiguity—quantum theory accepted a universe in which randomness plays a role. You can't have it both ways. Pejorative though his choice of words may have been, Eddington's protest—that to combine the two in one piece of work was unholy wedlock—did have a rational foundation. Einstein, whom Eddington championed, resisted quantum theory to the end of his life.

A further difficulty, Moonbearer's theory was built on the foundation of other theories. A shaky structure can result. An alternative interpretation of his findings would have been that either quantum theory or relativity, if not both, contained errors. In fact, unaware of Moonbearer's work, in 1932 Russian physicist Lev Landau published an analy-

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sis of the white dwarf problem which, mathematically, came to the same discovery Moonbearer had made; his conclusion, that under those conditions quantum theory did not apply. That, if pursued, would have raised the obvious question, *why not?*

Exactly when and where the line should be drawn between doubt and acceptance is, of course, a matter of judgement. Carl Sagan expressed the rule as, "Extraordinary claims require extraordinary evidence," but that's no help in dealing with the specifics of a particular case. And, at the interface between the known and the unknown, even the wisest can take a wrong turn. Opening a book at random, I learn Lord Kelvin, when informed of X-rays, suspected a hoax. Given a choice, whether stones could fall from the sky or that Yankee professors could lie, Thomas Jefferson did not hesitate to doubt the Yankees; but he swallowed whole a backwoodsman's yarn about mastodons trumpeting in the western forests. (Note: skeletons had been found; to imagine the living beast wasn't much of a stretch.) Convinced that Native Americans had come to the Americas not more than two thousand years before Columbus, the Smithsonian's Ales Hrdlicka attacked all evidence of greater antiquity with such scathing invective that few stayed around to argue; his opinion held sway until, near Folsom, New Mexico, spear points turned up among the bones of a buffalo species extinct for ten thousand years and were shown *in situ* to representatives of major institutions, the Smithsonian included.

Another unstated rule is that, so long as an established understanding gives satisfactory coverage to known phenomena, alternatives aren't taken all that seriously. The idea that all stars ended up as white dwarfs, having expelled enough mass to come below the 1.5 threshold, hung on until some time in the 60's when accumulating evidence made it no longer tenable. Similarly, with a solid planet underfoot, it was hard to imagine the cosmic abundance of hydrogen even after Mrs. G looked at starlight and saw what was really there. Likewise, though the concept of isostasy (flotation of the continents on the denser material of our planet's oceanic-type crust) was long established, the idea that the continents might bob and drift on that surface like rafts on water was nigh impossible to consider in spite of the peculiar congruency of the American coast to the continents across the Atlantic. Neither, if you look at it close, is that what happens. And, arguing for conceptual status quo, Lord Kelvin "proved" on thermodynamic grounds that our planet could not be more than forty million years old in spite of geological evidence for a much longer time span.

Usually, it's a conservative view that's upheld until overwhelming evidence accumulates, but a peculiar inversion has happened in the case of life on Mars. There, as more became known about the Martian environment, scientific estimates of what might be possible have backed down from Lowell's fanciful vision, further popularized by Edgar Rice Burroughs, of a civilization coping desperately with progressive aridity. A thin, and later even thinner atmosphere with scant moisture and no detectable free oxygen made animal life a dubious proposition, but vegetation? Well, maybe, if it's *desert*-type vegetation. Cold? Below freezing most of the time? So make it *cold-climate* desert vegetation. Then it became the tenacious sort of plants found above timberline, and finally hopes of something like lichen. Now, having learned that the Sun's ultraviolet light penetrates to the surface, the best anyone dares propose is extremophile bacteria (adapted to survive extreme conditions—heat, cold, pressure, etc.) deep underground and/or maybe not now but once, long ago. This last has some support from microstructures and chemical traces in a meteorite

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believed to have been chipped off Mars by a crashing asteroid several million years ago. By stretching, these can be taken as evidence that monocellular creatures once lived on Mars, but it falls far short of proof.

The trouble is, a view of Mars full of life was the idea started with. Now, without foundation, Barsoom's echo still reverberates.

It's not just new ideas that are tested, either. New technology and new insights allow established ideas to be retested. This is gleefully done. Long-standing theories go under the wrecking ball; some resist while others go down to let new science rise where they stood. (The continents don't float? Oh, but they do! But they don't drift. What really happens—so we think now—is a bit more complicated.) The only truly safe position to hold is that everything we believe true is tentative. It's pretty good, it gives reliable answers most of the time, but be prepared to be surprised.

Not that established ideas die easy. They became established by having survived every test fertile minds could apply, both when proposed and ever since. They became so entrenched that the Old Guard, who absorbed Burroughs and Bradbury along with their pablum, are reluctant to notice that the rug is gone from underfoot. A bitter joke has been that for a new idea to take hold the old generation must die off. For the young scientist struggling to complete his or her dissertation, it is a fact of life which looms large when something which does not fit shows up. Mrs. G's experience has been repeated thousands of times. For just one example, look up Svante Arrhenius.

But the beauty of the system is that ultimately the truth or falsity of an idea, fact, or experiment will become known. Experiments will be repeated by other workers using different equipment and perhaps a differing approach, and the results compared. A fact will be nailed down as was the presence of man-made artifacts with the bones of extinct bison, and in that instant a belief, regardless how comfortable or politically useful, must be set aside. Capture one living bacterium from under a rock on Mars—better yet two or three from under different rocks—establish beyond doubt they're not contaminants, and there I'll be with egg on my face.

Moonbearer took the only course he could. It was the right course. He published, putting forth his calculations and the conclusions he drew, and left the book to stand or fall. What no amount of argument from authoritative tongues could do, time did. After sixty years, regarded as a classic, the book is still in print. While not a comprehensive survey, every recent textbook I've checked gives Moonbearer's work several paragraphs, usually with his name firmly attached.

I suspect Moonbearer knew that if his work was correct, eventually it would become known. If, at some point, he had erred, that also would come out and no protest on his part would prevent its coming. Eddington must have known this also, and which of them was more tormented by doubt would be an interesting question to ask.

But the same process can also be cruel. Peter van de Kamp of Swarthmore's Sproul Observatory spent his career searching for evidence of planets orbiting nearby stars by means of the incredibly slight perturbation they would cause in the stars' movements relative to more distant stars, the same technique that discovered the companion to Sirius. It meant the collection of photographic observations over many years, same telescope used throughout, painstaking and repeated measurement of those photos using the same equipment operated by the same personnel, and backbreaking calculations done by hand. He identified several, including two or possibly three around the same star.

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Just one trouble. At Pittsburgh's Allegheny Observatory, which had a similar telescope, George Gatewood and colleagues searched their own files, measured, and calculated. They could not confirm van de Kamp's findings which, had they been real, they should have. The currently ongoing extrasolar planet search programs, which use a different technique and which, since 1995, have found evidence of something like fifty as I write, have also checked out the stars van de Kamp surveyed; to date no unseen companions have turned up with the exception of a report, summer of year 2000, of a roughly Jupiter-sized world orbiting Epsilon Eridani but whose mass and orbital period do not match what van de Kamp reported.

(Take care, though. First, this latest report has been met with doubt by some, who feel not all alternative interpretations of the data have been ruled out. Second, the technique by which these recent discoveries have been made—detecting slight, regular doppler shifts in the wavelengths of light from these stars—is most sensitive to short-period orbits whose plane lies edge-on to our line of sight, while van de Kamp's method would have most easily detected planets whose orbits were of much greater duration and viewed perpendicular to the orbital plane. This means effects detected by one technique would most likely not show in observations done by the other.)

What went wrong? Good question. Upon investigation, it came out that midway through the years van de Kamp collected his photos, Sproul's telescope was renovated, a procedure which included replacement of the cell containing the telescope's lens. This *might* have microscopically, indetectably altered its focal point. The tiny difference introduced by that repair could be enough to skew the data. Result: a lifetime's work gone like a popped balloon.

That is what happens when you do research.

But mathematics, properly applied, is not prone to that sort of artifact, and almost by definition a theory has the advantage of being a generalized statement which, so long as consistent with known facts, can be entertained, even utilized, without the illusion of certainty. Tested by careful observation, either in the laboratory or—when that not possible—in the Universe at large, and also by the rigorous analysis of many workers over many years, reliable theories can be sorted from those that don't fit. Reliable ones, then, are refined from blurred beginnings toward a more exact, though perhaps still not perfect, description of the way things truly are. Even mathematics evolves by this process; invalidate a theorem previously thought proved beyond doubt and great shall be the weeping and wailing—not to mention protests that the invalidation is itself not valid—from practitioners of the art.

Moonbearer's theory has come through the process essentially unchanged. Parameters have been adjusted and the calculations refined, but the fundamental fact, if such we dare call it, has stood all tests. Greater in mass than a point somewhere between 1.4 and 1.5 times the mass of our sun, a white dwarf cannot exist. What can? So far we have neutron stars and black holes, and of black holes we have three general types: ordinary, intermediate, and the supermassive. As for the nature of matter inside a black hole—well, that less-than-zero radius still bothers me. I suspect it's a case of you can't get there from here, but I'm not qualified to have an opinion. Perhaps it's telling us something which no one's thought of yet, like Dirac's electron with a positive charge. Maybe we'll just have to wait until the next Young Squirt comes along.

Because of Moonbearer, though, we know more than we did. Combined with other discoveries, his outrageous theory now underpins much of what we *think* we know about stellar evolution,

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the origin of heavy elements, novae and the several types of supernovae, neutron stars (and therefore pulsars), black holes, and even—though perhaps here I strain too far—the age of the Universe itself.

All this because a young man on a lonely voyage had a strange thought. Now an orbiting x-ray observatory is named in his honor and, in 1983, almost fifty years after Eddington's denunciation, the Nobel Prize for Physics went to Subrahmanyan Chandrasekhar, his theory outrageous no more. I don't recall if the news reached me first by radio or newspaper but, when it came, I remembered his joke and thought: Yes. O yes.

ABOUT NAMES NOT NAMED

Deliberately I have not identified persons encountered or heard of personally, in part to avoid the appearance of name dropping but also because few things fall so flat as one dropped which is not picked up on. In most cases, they're names known only to those well informed about astronomy, and even to them some are poorly remembered today. For the curious, however . . .

The moon expert was Ralph B. Baldwin. I should add that I left out significant information. The Oliver Machinery Company was a family-owned firm which he was "called home" to help manage, meanwhile continuing to do research in his spare time. Ultimately, *circa* 1970, the business was sold and he retired to Florida where, last I knew, he was living just up the road from Ben Bova.

The man who helped develop the aluminization process was Robley Williams. Later he moved to University of California, Berkeley, from where he eventually retired. Though information reaching me is scant, I understand his last years were not pleasant. Speechless from a stroke and otherwise incapacitated, he died some time in the '90's.

The Afro-American astronomer is Benjamin F. Peery. I understand Afro-American astronomers are still few; offhand I know of only one other.

The astronomer at Lick was Hamilton Jeffers. Except for Dad's mention, I've encountered the name only in Burnham's. I infer that, like Dad, he was one who gathered pebbles on the shores of discovery from which others, later, would construct grand mosaics. Better known, his poet brother was Robinson Jeffers, some of whose verse suggests exposure to astronomy.

As for Mrs. G and her husband, they were Cecilia Payne-Gaposchkin and Sergei Gaposhkin. The "*Science's* Compass" article mentions a TV documentary about her being in development, but I do not know if it was completed or broadcast. As for Sergei, I vividly remember his ebullient spirit, without which I would have been unprepared for my first encounter with Isaac Asimov.

BIBLIOGRAPHY

It's instructive to review old, outdated textbooks in the light of current understandings. New concepts, interpretations, and empirical information phase in and, later, are replaced by better information and more satisfactory theories. Well, so we hope; not always is the latest wrinkle the most reliable. Also we need to keep in mind that to be useful as a textbook the work must reflect a consensus of what is accepted as correct by practitioners of the time, irrespective of the author's personal leanings. Where issues still under debate are discussed, alternative interpretations have to be included. In the earlier volumes I consulted I was struck by how frequently they admitted, that much was not understood. Cautious, qualified statements abound. Theories and interpretations tend to be given as; "A spectrum taken by Adams indicates . . ." and "Eddington concludes that . . ." Positive statements of absolute fact are rare.

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Don't imagine I've read each book from beginning to end. Though frequently I'd browse, I focused on passages the index pointed me to. This did require some searching, however. For example, in one of the books from the 1920's, *white dwarfs* do not show as a separate category; they're covered only by the entry "dwarf," along with the better known red dwarfs as a subset of "Stars". Also, related subjects had to be checked. It's interesting that, with so few white dwarfs known back then—by 1922 I gather only three had been identified—they were discussed at all. They were an irritant; they did not fit.

That's where new science comes from. Things that don't fit.

Burnham, Robert, Jr., *Burnham's Celestial Handbook*, 3 vols, revised and enlarged, 1978, Dover Publications.

Reviewed as virtually free of error when published (but Hal Clement has told me of one), a marvelous set of browsing/reference books all the more astonishing when one learns the author's formal education ended with high school. (He should not be confused, though often was, with similarly named Robert Burnham, lately retired editor of *Astronomy* magazine, no relation.) Employed as a technician at Lowell Observatory, he assembled vast masses of data, both technical and historical, from the observatory's library.

Excellent discussion of white dwarfs under the entry for Sirius. A "representative list of white dwarf stars" fills eight pages, 40-odd to a page. Following that comes another eight pages of notes about some of them.

Clarke, Arthur C., *Profiles of the Future*, Harper & Row, 1962.

Supplies the soundbitten version of Sir Richard Woolley's remark with just a hint of its context. That he was travel weary I base on memory of a reader's response letter in a magazine (possibly replying to an article by Clarke incorporated into the book) plus the information that Woolley was associated with Australia's Mount Stromlo Observatory before appointment to Astronomer Royal. In 1956, air travel was less swift than now and, in some parts of the world, facilities primitive.

Duncan, John Charles, *Astronomy*, First Edition, 1926 and Fourth Edition, 1946, Harper & Brothers.

For many years the dominant college textbook.

First edition mentions S Doradus, luminosity 600,000 times our sun. Companion to Sirius mentioned as "one of the few known examples of white dwarfs." Eddington's conclusions about the companion given in full detail. Fourth edition repeats data on S Doradus without alteration, while on the subject of white dwarfs Duncan has added, "probable that white dwarfs are fairly abundant in space, though they are not so in star lists."

Evans, David S. & Mulholland, J. Derral, *Big and Bright, a History of the McDonald Observatory*, University of Texas Press, 1986.

Provides translation of Chandra's name, found nowhere else but documented to have come from the man himself. Also mentions Robley Williams' having a role in development of the aluminization process. I have another book which gives sole credit to John Strong. While I understand Strong originated the process, I infer others contributed.

Gamow, George, *The Birth and Death of the Sun*, Mentor Books, 1952.

Contains the earliest clear presentation of Chandra's theory I have found in any book intended for a general audience. Copyright notes list previous editions in 1940 and 1945 not seen by me. While I suspect the theory would have been included as early as the first, I cannot confirm.

Gamow explains the carbon cycle

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theory of solar energy in detail. He rejects hydrogen fusion for reasons thought valid at the time.

Gamow, George, *Thirty Years That Shook Physics*, Anchor Books, 1966.

Includes personality portraits of Bohr and Dirac. No reference to Chandra. Eddington mentioned obliquely in the appendix. Polytropic spheres defined.

Goldsmith, Donald, *Supernova, the violent death of a star*. St. Martins Press, 1989.

One of several books published following the appearance of supernova 1987A in the Large Magellanic Cloud. Contains a succinct, standard presentation of Chandra's theoretical conclusions; maximum mass for white dwarfs given as 1.4. No mention of Eddington's opposition.

Hillerman, Tony, *The Great Taos Bank Robbery*, University of New Mexico Press, 1973.

A collection of magazine nonfiction by the mystery novelist. One entry relates the discovery and archaeological significance of the Folsom, New Mexico buffalo kill site. Also the story of an extraordinary black cowboy. An article in *Natural History*, mid-90's, may have drawn on Hillerman's reportage.

Kippenhahn, Rudolf, *100 Billion Suns*, Basic Books, 1983.

Originally published in German, 1980. Standard, somewhat simplified explanation of Chandra's theory of white dwarfs, with maximum mass stated as 1.4. Controversy not mentioned.

Kippenhahn, Rudolf & Weigert, A. *Stellar Structure and Evolution*, Springer-Verlag, 1990.

An advanced textbook, impenetrably mathematical to ordinary humans, it purports to describe Chandra's findings in elaborate formulae. I'll take their word for it. Finds maximum white dwarf mass to be 1.46 solar masses, assuming all hydrogen has been converted into heavier elements or expelled. "Indeed no white dwarf has been found which exceeds this mass," a statement I've also seen elsewhere.

Krogdahl, Wasley S, *The Astronomical Universe*, Macmillan, 1952.

Textbook by a student of Chandra's. 115 white dwarfs known. Presents the earliest textbook reference I've found to Chandra's theoretical work, though extremely vague and the maximum mass wildly off at "about five solar masses." This may have been forced by data of one white dwarf at 2.8 solar masses and "no white dwarfs are known with masses over 3.5 times the sun's." Theory must always yield to observed facts, but observed facts are subject to correction. I presume this has happened but have not discovered when or by whom.

Also, interesting in view of when written: "Conceivably the relativistic [gravity induced] shift for such a star could shift the wavelengths of its strongest radiations entirely out of the visible region of the spectrum, in this way making it invisible to us."

Lemonick, Michael D., *Other Worlds, the search for life in the universe*. Simon & Schuster, 1998.

A science writer for *Time*, Lemonick has also published articles in other magazines, some under the pseudonym Sam Flamsteed. Here he provides a fuller and more humanized account of the pulsar planet's discovery and subsequent invalidation than seen elsewhere. Also, sympathetically but more briefly, he tells how van de Kamp's long years of effort came to naught.

Marschall, Laurence A., *The Supernova Story*, Plenum Press, 1988.

Another work on supernovae published after the appearance of 1987A. Somewhat more thorough than Goldsmith, above. Standard presentation of

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Chandra's conclusions but neither controversy nor Eddington mentioned. In a curious lapse, Marschall writes that Chandra did this work at the University of Chicago.

McLaughlin, Dean B. *Introduction to Astronomy*, Houghton Mifflin Co., 1961.

Dad's textbook, published just in time to not include discovery of quasars. The earliest textbook in which I've found a clear statement—though brief—of Chandra's theory, but I make no special claim; from the 50's I have only Krogdahl's and one other (1959) which, though discussing white dwarfs, makes no mention of Chandra or his theoretical conclusions. A first printing copy of Dad's book can be identified by the photo of Meteor Crater, which some page makeup genius put in upside down.

Russell, Henry Norris; Dugan, Raymond Smith; & Stewart, John Quincy. *Astronomy*, Vols I & II, A revision of Young's *Manual of Astronomy*, (1907) Ginn & Co. 1926.

Includes mention of S Doradus as an irregular variable, which by itself would invalidate one aspect of van Vogt's story. "At maximum it gives off 500,000 times as much light as the sun." (Note discrepancy with Duncan, above.) White dwarfs defined and described but considered "strange," poorly understood, and few known. (A table lists three; not clear if others had been recognized.) Contains also extensive reference to *Stellar Atmospheres* by Cecilia H. Payne (Mrs. G), very probably her dissertation. Discussion makes puzzled reference to the persistence of hydrogen in stellar spectra but her backward-phrased discovery is ignored and the then-held view of chemical abundances maintained. Russell's 1930 paper to correct this view was certainly needed, but he must have known that in 1925 he gave poor, albeit properly conservative, advice.

Shipman, Harry L., *Black Holes, Quasars, and the Universe*, Second Edition, Houghton Mifflin Co., 1980

Thorough discussion of white dwarfs, neutron stars, and black holes. Chandra's theory presented as accepted fact. "More than 500" white dwarfs identified. (Note discrepancy with Burnham, above, and Zelik below. I have another book, dated 1985, which also gives the 500 figure, but lists Shipman's book in its bibliography.)

Skilling, William T. & Richardson, Robert S. *Astronomy*, revised edition, Henry Holt & Co. 1947.

Richardson contributed numerous astronomical articles to *Astounding* during the 1940's and '50's, as well as several stories under the pseudonym Philip Latham. The 1947 edition states that 80 white dwarfs were then known, the most massive being reported at 2.8 times the sun. (See remarks under Krogdahl, above.) Also describes in detail the carbon cycle of stellar energy production, then thought to be the process in our sun, but also treats the hydrogen-helium process thought to occur only in red supergiant stars, believed at that time (incorrectly) to have only recently formed.

Time-Life Books, editors of, *Stars*, Voyage Through the Universe series, Time-Life Books, 1988.

Impressively illustrated—both graphics and photos—historical narrative of discoveries about the nature of stars. Includes a personality sketch of Eddington, Payne-Gaposchkin's discovery (without mention of Russell or the negative phrasing she had to employ), and the Chandra/Eddington confrontation. The latter probably drawn from an article cited in the bibliography from *Physics Today*, October 1982, by Wali (see entry below), almost certainly the piece which I remember but failed to retrieve while preparing this account.

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Wali, Kameshwar C., *Chandra*, a biography of S. Chandrasekhar, University of Chicago Press, 1991.

Written with Chandra's blessing and cooperation, with reliance on interviews, access to his papers and correspondence plus, of course, other sources. Therefore the most reliable source of biographical information from Chandra's point of view. To support his account of the controversy, Wali cites a report of the meeting in the Royal Astronomical Society's *Monthly Notices* and letters from persons who were there. A physicist and himself from India, Wali would appear especially qualified to write on both the society from which they both came and the technical aspects of Chandra's work. Though looking into other areas, the focus is on Chandra's scientific career.

Youngson, Robert, *Scientific Blunders*, Carroll & Graf, 1998.

In spite of its pejorative title a basically intelligent, fair-minded set of cautionary tales of error weeded out of scientific knowledge. Not, however, without its own load of factual errors which makes it untrustworthy on specific details. In spite of this, it presents (without discussion) Sir Richard Woolley's complete remark rather than the soundbitten version seen elsewhere; while it carries the ring of truth, I'd have preferred to find it in a more reliable source.

Zeilik, Michael, *Astronomy: The Evolving Universe*, 3rd edition, Harper & Row, 1982.

Contains a standard, very clear description of Chandra's theory, but attributes the work entirely to 1935. No mention of controversy. Another section evenhandedly covers van de Kamp's work on extrasolar planets and Gatewood's refutation, leaving the matter in doubt. Also gives a fuller discussion of amino acids in meteorites than found elsewhere. "About 300 stars have been identified as white dwarfs," a number consistent with Burnham's list but would imply Burnham left out very few.

In addition to the preceding, I've drawn on many years of following the magazines *Astronomy* and *Sky & Telescope* as well as relevant material in other science-oriented books and magazines. Also, long ago, conversations with Dad. Exactly where I picked up a particular item, frequently I do not recall and haven't searched out. Of the magazines named here, *Sky & Telescope* assumes greater grasp of subject on the reader's part but both are informative and generally reliable. Both feature newsnotes of recent developments and articles dealing in depth with selected topics both current and historical.

Finally, please don't consider me an authority. I've tried to get it all both clear and correct, but should my information or judgements conflict with others; it's most likely me who's off.

ABOUT THE AUTHOR

Dean McLaughlin has contributed occasional stories to *Analog*, and before that to *Astounding*, since 1951. Of his rare nonfiction pieces, this is his first to appear in *Analog*. ■

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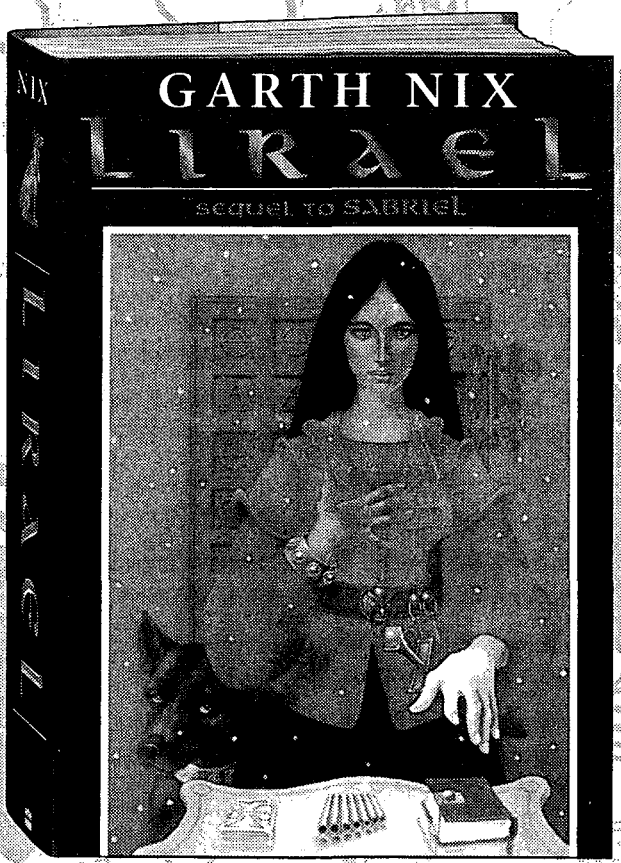

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The line between high diplomacy and low comedy is sometimes painfully fine. . . .

Naked Came the Earthling

H.G. Stratmann

"You want us to do *what?*" Adam Tremaine, 45th president of the United States, gaped at the stranger sitting opposite his desk in the Oval Office. The alien scrunched his shiny viridescent face and spoke with a BBC announcer's elegant diction.

"Our suggestion is simple. Follow it, and your planet takes its proper place in the Commonalty of Sentient Beings. Refuse—and your species' fate will be exceedingly different."

"What you're suggesting violates a strong tradition in most human cultures. You can't realistically ask people to change lifelong attitudes in a week!"

The massive two-meter-tall being named RAH fluttered six eyestalks tipped by unblinking apple-sized eyes. "My colleague, AMD, and I would be distressed if your race decides to risk annihilation by clinging to a primitive taboo. We did not intend to place you humans in peril. However, after finding your planet during our survey of this spiral arm, we were legally obligated to file a Notice of Discovery with the Galactic Registry of Intelligent and Near-Intelligent Species. It is standard procedure to dispatch an Inspector to classify a newly-discovered world's highest life-forms regarding their proper place in the Commonalty. That being's rating will determine your species' future—or if it *has* a future. Your Inspector's starship will arrive in 257.46 diors—roughly, 167 hours."

Adam ran his hand through blow-dried brown hair, feeling far older than his 45 years. He felt wrinkles popping out on his photogenic boyish face. "Why is the way we're dressed for this Inspector important? Does everybody you discover have to do it?"

"No. The rating system for new species is officially based only on universal criteria. Primarily the candidate's level of technological achievement, and how sophisticated its dominant cultures and ethical systems are."

RAH uncrossed two elephant-thick legs and leaned forward in his undersized chair. "We estimate the Inspector will rate your world's technology 'Mediocre', its level of culture 'Primitive'. Some of your ethical principles are, conversely, surprisingly advanced. Unfortunately, based on our review of human history and current practices, the Inspector will be appalled at how poorly you follow them."

Thanks for the vote of confidence,

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Mr. Alien Weirdo Jerk! Then Adam's belly cramped fearfully. What if his visitor was *telepathic?*

"We'll try to be on our best behavior for the Inspector."

"An excellent idea but, I fear, insufficient for your species to avoid an unwanted fate. Following our suggestion could make the difference between humanity's continued presence on Earth—or its disappearance."

"But *why* is it so important? You said it's not required by your rules!"

"Because, as with officials on your world, Inspectors interpret and apply those rules in ways reflecting their own prejudices and interests. The Inspector coming to judge you is a Gorgiasian. Hir culture has dogmatic religious beliefs about how intelligent beings should dress. S'he will be insulted if s'he sees any humans attired in a way considered sacrilegious by hir race. Such subjective impressions are not supposed to count against the rating s'he gives you. Nonetheless—they surely will. And, considering how tenuous your situation is judged by *objective* standards, you must do everything you can to avoid offending hir."

Adam nervously loosened his silk tie emblazoned with the Presidential seal. "You don't realize how difficult it'll be to convince seven billion people to do what you want! Maybe if you address the United Nations—"

RAH rippled the wheat-colored fur covering his undraped body. "No. It is customary to contact and work exclusively through a planet's strongest ruler. I realize your world's backward political system is fragmented among many tribal units, and you have limited power even within your own 'country'. Nevertheless, you are Earth's closest approximation of a Supreme Leader. *You* are therefore responsible for convincing your people to prepare themselves properly for the Inspector—and for the fate of your world."

RAH lowered one of his paired upper limbs to his waist, stroked a control rod—and vanished.

In the sudden silence, Adam tried convincing himself none of this had happened. It'd been a bad dream—and the refugee from a schlocky sci-fi movie he *thought* he'd talked with was just a bit of undigested rubber chicken from that recent $10,000-a-plate fundraiser in Peoria.

Things like this didn't happen in real life. If some no-talent writer used it as the plot for a story, even the editor of *Spicy Tales of Weird Science* would reject it!

Then he noticed the chair in front of him. Its seat cushion was covered with golden fur the ungarmented alien had shed like a shaggy dog.

Sighing, Adam swiveled and flipped on a TV monitor. It showed a microcam view of the rose-colored thirty-meter- wide saucer resting outside on the White House lawn, surrounded by a shimmering force field. Beyond the spaceship, faded October sunlight shone on a deserted Pennsylvania Avenue. Only a few Secret Service agents patrolled the grounds.

Perhaps he'd overreacted by having Washington's entire civilian population evacuated. From the time NORAD detected the starship entering orbit yesterday morning, he'd had to make too many critical decisions too quickly to get them all right. Especially in those frantic minutes before the ship swooped down to an eerily silent landing outside, with advisers screaming hysterically.

Shouldn't we launch an ICBM, Mr. President?

Sir, it's headed towards Washington! You must leave the White House now!

So far the tack he'd taken—forbidding any aggressive measures, and staying here at his post—had kept the human race alive another day. Long enough for the aliens to contact him

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via the White House intercom system and set up this meeting.

As he'd often done over the last four years, Adam scanned his surroundings. The U.S. and Presidential flags flanking his desk. The Presidential coat of arms emblazoned on plush cerulean carpeting. The portrait of George Washington in Continental Army uniform hanging above the marble mantel at the opposite end of his office.

Trying to absorb the courage, strength, and wisdom his predecessors displayed here during earlier crises, he thought of Lincoln—sadly pondering how to save the shattered Union. FDR—confronting the Axis powers at their demonic zenith. JFK—charged with avoiding nuclear apocalypse during the Cuban missile crisis. Clinton—struggling with his legal team to define with metaphysical precision words like "is" and "sex".

And now *his* moment of truth had arrived in the Wellsian nightmare of alien invasion. Not with macrocephalic Martians blasting a joint session of the currently recessed Congress. Not with a flying saucer slicing through the Washington Monument, or vaporizing the White House minutes after he dramatically escaped by helicopter. Not even with him merely sending his secretary to question a wounded spaceman.

No, *his* aliens had to demand something nobody would take seriously. Something so ridiculous *he'd* laugh at it if humankind's fate weren't at stake.

This decision was too great a burden for one person to shoulder. He nudged an intercom button.

"Has everyone arrived?"

"Yes, Mr. President"

"Tell them I'll be right there."

Adam felt his depression ease. Assembled nearby were his administration's most experienced, competent officials. With their calm, sober advice to guide him, he *would* find a way to convince everyone on Earth to show proper respect for the soon-to-arrive extraterrestrial Inspector—by taking all their clothes off.

Adam waited impatiently as the members of the National Security Council, seated around a long mahogany conference table, rocked the Cabinet Room with hysterical laughter.

"This *isn't* funny!"

Sergio Castillian, director of the CIA, guffawed so hard his dentures rattled. "I'm sorry, Mr. President! Not even we have any 'alien contact' contingency plans that cover this!"

Admiral Hamlet Noseblower's grizzled burr-cut head chortled in agreement. The left side of the Chairman of the Joint Chiefs of Staff's uniform sagged with a kaleidoscope of ribbons and medals. "Neither do we! Can you imagine me ordering out troops to *make* people strip naked? I'd rather take our chances nuking their invasion fleet!"

Harry Dunn, Secretary of Defense, bobbed his fleshy scalp and giggled, "Me too!"

"And what will foreign governments think?" Cassandane Caven, Secretary of State, straightened her silver wig and cackled, "Those who hate our guts—even our allies!—will say you're trying to make them and their people look stupid when this Inspector comes!"

Vice President Thomasina Hobbes tapped her ebony fingers thoughtfully against the table. "So far this 'alien menace' crisis has boosted our popularity. Most instapolls now show us leading by 5% in next month's election. But you won't look dignified or presidential telling the American public to go nude because these space creatures say so. Our numbers would drop even lower than before that saucer landed!"

Adam glared at his African-American running mate. "Where are your priorities? The human race's survival is at stake—and you're worried about the

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election!"

"I'm being practical. If these aliens turn hostile, the whole country—the whole *world*—will rally around you. If they just stay a threat for two more weeks, the voters won't want to change leaders during a crisis. But if you look weak—pleading with people to cave in to some monster's disgusting demands—we'll all be unemployed in January!"

"And what if this Inspector is furious at us for not getting naked? She may have enough super-scientific firepower to incinerate the entire planet!"

Hobbes shrugged. "If Earth's destroyed, there's no *harm* done thinking about the election."

From the chair closest to the president, press secretary Lilith Evans' sultry soprano murmured, "An aggressive media campaign might make people accept universal public nudity."

She tossed back gleaming auburn hair, smiling at Adam with bewitching scarlet lips. "We could place ads in newspapers and magazines with a 'Naked is Beautiful' theme. Radio and TV announcements, saying taking your clothes off is the patriotic thing to do. Saturate the Net with messages to 'Strip for Peace'."

The others at the conference table stared at her, jaws dropping. Adam's eyes drifted from Lil's face to the swelling roundness of her taut alabaster blouse. A miasma of jasmine perfume wafted from her into his ravenous nostrils—inflaming his imagination. He pictured her supermodel proportions posed on a luxurious settee in both versions of Goya's *Maja*. One, with her enticing curves draped by the tight sweaters and flowing skirts she favored. The other, with all her soft, creamy, sizzling flesh—at age 35, peaking at its most sensual feminine ripeness—exposed to the eager sight and press of his own body.

Castillian grunted. "So what would you do with this media blitz? Encourage people to get naked by putting buxom centerfolds in mainstream magazines, like *Newstime?* "

"Beefcake ones too!"

The CIA director nodded at Caven. "Maybe your ads could point out the advantages of everyone being naked. Wouldn't have to worry about anybody carrying a concealed weapon. No more guessing if your date is enhancing her natural pulchritude with a high-tech bra. Save a fortune on laundry detergent. And for the TV spots—shots of nude beaches on the Riviera, and in-depth documentaries on Las Vegas bordellos! "

Lil listened patiently. "No. Everything will be tasteful. We'll use pictures of famous statues—Michelangelo's *David*, and the Venus de Milo. Tell people Olympic athletes in ancient Greece competed in the nude. Remind them how Lady Godiva helped *her* people. We'll compare it to what everyone does when they go for a doctor's examination."

Noseblower groaned. "Great analogy. That'll conjure up an image of the entire human race being chased by aliens with atomic proctoscopes!"

Caven glanced at the president, then Lil. "I'm sure *some* people wouldn't mind if *you* pranced around in the buff, my dear. But *most* people don't have bodies worth showing off."

She ran a wizened hand across her cheeks. "If you think I'm wrinkled here, you wouldn't want to see the rest of me!"

The Secretary of Defense sucked in his potbelly. "Speak for yourself. A few months at the gym and I'd have Abs of Steel."

Caven snickered. "Better work on those Buns of Lard first!"

Adam reluctantly interrupted his fantasy of the *Naked Press Secretary*. "That's enough! Only Lil's given any constructive advice. The rest of you are just making one-liners!"

His eyes flashed across them like a

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prison searchlight. "If we ignore these aliens' advice and this Inspector *is* insulted by not seeing us all naked, the human race might be exterminated! But if everybody strips, the worst we'll lose is our dignity—*and* we'll still be alive."

Lil beamed as Adam turned towards her. "I want to see your 'Naked is Beautiful' media campaign up and running by tomorrow!"

Hobbes snorted. "This'll make us the laughingstock of the whole world. You're committing political suicide!"

Adam's shoulders slumped. "Maybe. But, if it ensures anyone's still *around* to ridicule me next week—it's worth the risk."

Harriet Slonen collapsed onto her trailer home's living room sofa and ripped open a kilogram bag of Nacho Barbecue Cheese Cholesterol Crunchies. Her expansive weight activated the three-meter diagonal Sim-3-D television screen covering the opposite wall, and switched its satellite receiver to the *Sci-Fi Soap Opera Channel.*

As she transferred the greasily delicious snack to her digestive system, Harriet sighed gratefully. When that damn flying saucer landed last Saturday all her favorite programs on the system's 1588 channels were pre-empted by boring "specials". News anchors interviewing sweaty government officials regarding the aliens' intentions. Nerds from NASA, speculating about where they came from and what propelled their spaceship. The only interesting show was a panel of science fiction editors and writers discussing the impact this proof of extraterrestrial intelligent life might have on humanity's religious beliefs, social values, and technological progress. Some of those guys were real hunks.

But now most channels were back to their usual fare, and she could catch up on the latest installments of the hottest sci-fi soaps. Classics, like *All My Genetically Engineered Embryos.* That newcomer about young humanoid robots starring the Chippendale dancers, *The Hung and the Rustless.* And her favorite—*As the Galaxy Spins.*

In the show's most original, tragic storyline, the handsome Eddie Pes—powerful CEO of Terran Hyperspatial Broadcasting Systems—had just learned the shocking truth about his beloved wife, Jo. She'd never told him she was a "slushie" from the 22nd century—defrosted from cryogenic sleep shortly before they'd met and fallen in love. Only after their first-grade daughter Tiggy compared her parents' DNA for a science fair project was the terrible truth discovered. As the horrifying realization he'd married his own great-great-great-great grandmother on his father's side sank in, Eddie dramatically tore baby-blue contact lenses from his eyes.

Following that gut-wrenching climax and several commercials for feminine hygiene products, the program switched to Harriet's favorite lovers—Commander Haimish Octavius Church of the starcruiser *Beau Geste,* and the exotic Princess Narcissa. Little did either know, she was really Church's own transgender, age-accelerated clone—created from a foreskin cell he left behind with a courtesan employed by his Susian archenemy, S'am-i-am, Satrap of the Twenty-Six Systems. While the distracted commander exhausted his sexual energy with the princess, that fiendish feline alien continued its nefarious conquest of the Galaxy unopposed. Harriet sobbed as Church tenderly whispered to his beauteous companion on the rumpled bed, "It's lonely being a leader, responsible for everyone's welfare. You're the only person I can share my troubles and doubts with."

The trailer's door burst open—followed by the roar of a departing

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school bus and two preteens tumbling into the room.

"Ma, where's today's mail?"

"Over on that chair. And shut the door!"

Twelve-year-old Dave rifled through the stack of overdue bills and credit-card offers—but nine-year-old Dickie grabbed the sought-for magazine first. They spread it on the floor and extracted a folded insert. As their mother tried concentrating on the TV thespians' renewed gymnastic couplings in deep space, high-pitched giggles distracted her.

"Wow! The kids at school were right! Look at that one's honkers!"

"Yeah! His thingie hangs down to his knees!"

"Lemme see that!" Snatching the magazine from her offspring, Harriet frowned at the centerfold. It showed a multinational, multiracial, multigender group of two dozen colorfully clad people ranging in age from late teens to geriatric. They stood in line holding hands, smiling insouciantly—until she turned the sheet to a certain angle. Magically all their apparel disappeared, and the nude crew's beaming faces turned up toward the heavens. There, amidst fleecy clouds, a Roswellian alien smiled benignly down—green arms outstretched to embrace them.

Without reading the caption ("Will You Help Save the World Sunday, November 1st?") and text, Harriet screamed, "Go to your rooms!" Then, to the couch-computer, "Activate e-mail. Dear *Newstime*. Cancel my subscription immediately. How dare you put such filth where innocent children could see it!"

Margarete grabbed the pole in the crowded subway car as it accelerated to Formula One speed. After five months at her new job, commuting was the only thing she disliked. Her boss and co-workers were super, belying the warnings townsfolk gave her about "nasty New Yorkers" when, brand-new journalism degree in hand, she'd departed her hometown of Springfield, Illinois. Now, as the Sub-assistant to the Assistant to the Associate Editor at a major publishing company on Park Avenue, she was finally independent—and making her mark on the world.

"Are you a religious person, my dear?"

The bespectacled elderly gentleman sharing her pole spoke in a mellow baritone, and clutched a long overcoat tightly around him. His smiling goatee would've been at home on a bucket of fried chicken.

Margarete fingered the cross hanging between her breasts from a gold chain, and smiled back. "I try to be."

"See that advertisement?"

She followed his glance to a colorful poster depicting another aged, bearded man nearly touching the finger of a much younger one reclining unclothed on the ground. "I remember that picture from my Art Appreciation class in college. It's on the ceiling of the Sistine Chapel."

The grandfatherly figure nodded. "Yes. Perhaps Michelangelo's finest creation. But notice how they're using it to appeal to people with strong religious beliefs."

Margarete brushed perky cinnamon bangs from her forehead, frowning at the message above the picture. *It's no sin to be naked for a heavenly cause. Do your part to greet our alien visitors by going nude on Sunday, November 1st!*

She blushed. "I couldn't do that. I'd be so embarrassed!"

"Nonsense! An innocent Edenic nakedness can encourage prayer. Perhaps you read Boccaccio's *Decameron* in a Literature class. Specifically, his final tale of the Third Day."

Her companion's overcoat whipped open—revealing that his clothing ended at the top of his socks. Margarete

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gasped at his hirsute nude body. He leered satyrically, "If we were both dressed like this, my devout Alibech, I'd teach you how to thrust this proud devil of mine back into Hell!"

Troy's arm rested lightly across Cressie's shoulders as they sat on the couch in his apartment. From the ancient TV before them syrupy symphonic music swelled to a climax as the soon-to-be lovers of *Insomnia in Indianapolis* chastely embraced after their long quest for each other. As lightning flashed through the thunderstorm raging outside the window, his date extracted a hanky from her purse and dabbed sweet azure eyes—overcome by the movie's sentimental ending.

The evening was going just as he'd dreamed. Forced to take that job as waiter at the Chez Blanc restaurant last month to support himself, he'd felt a failure at the age of 28. All those years of education and scholarship—just to show snooty fat cats to tables, and clean up their culinary detritus!

Then he'd met Cressie. Her honest raven tresses stood out from the other waitresses' artificial bleached locks like a soothing starlit night sky beside the harsh glare of bare light bulbs. But his appreciation of her graceful beauty surged even more when he discovered how her life and dreams paralleled his own. Like him, she'd recently received her Ph.D. in Medieval Literature. Like him, she'd searched vainly for a job better suited for her training and erudition.

They sustained each other's spirits by discussing topics of mutual interest at the restaurant. Seated together at a still-dirty round table after everyone else left for the night, they debated Malory's treatment of Launcelot and Elaine. Amidst plates piled with chicken bones, they analyzed Chaucer's use of rime royal stanza in *The Parliament of Fowls*. Beside the silk flowers of the table's centerpiece, they critiqued Jean de Meun's continuation of the *Romance of the Rose*.

Troy realized he'd fallen in love with Cressie after writing a gushy Petrarchan sonnet in her honor. Too shy to express his feelings directly, he'd invited this combination of Laura and Beatrice to his apartment. Tonight, after a candlelight dinner, he'd let the movie's love story express his own longings for her. And if Fate decreed she felt attracted to him as more than a fellow medievalist, let their affair to remember evolve nice and easy—slowly, romantically savoring each new emotional and physical milestone in their relationship. Like his arm gently caressing her shoulder, or the toe-tingling goodnight kiss he hoped she'd grant him when he drove her home tonight.

As the movie's closing credits faded, Cressie sobbed, "Wasn't that romantic?"

Suddenly the TV blared, "Next on the *Heterosexual Love Channel*, watch new perversions from around the world on *Honest-to-Goodness Naked People Having Simulated Carnal Relations!*"

Troy scowled, reaching for the remote control to shut off that crass intrusion into the evening's mood of courtly love. But before he found it a bare nubile blonde popped onto the screen and cooed, "I'd *love* to get naked with you November 1st!" Then an equally unclothed muscular stud appeared and boomed, "Let's all do it, guys and gals!"

Suddenly the screen filled with lusty naked young bodies—writhing in a creatively-choreographed bacchanal. Throbbing rock music accompanied their chant.

Let's all get naked for the alien,
Who'll visit us next week.
Wear just your skin,
and a great big grin,
Or she'll think you're a real geek!

Their orgiastic gyrations and exhortations ended with the words "A Pub-

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lic Service Announcement, produced by Pandarus Entertainment." Troy shook his head disgustedly. *How unromantic can you get.*

"Will you do it, Troy?"

"What?"

"Go naked when this head alien comes next Sunday."

"No! I'd only take off my clothes for somebody I really, *really* cared about."

"I feel the same way. That's why I brought these."

Cressie pulled a handful of foil-wrapped, ribbed Achaeans from her purse.

They didn't watch TV anymore that night.

"My advertising campaign's a disaster."

Lilith sagged dejectedly in her chair in the Oval Office like a deflated balloon. "The first instapolls after you announced the aliens' demands said 5% of Americans planned to go nude when the Inspector comes. After my staff and I worked round-the-clock to make and spread our ads, today's polls say only *1%* will do it!"

"That bad?"

"We're doing better with some groups. The Society of American Nudists and Streakers is firmly behind us. So are most teenage boys. Unfortunately, parents with high-school-age *girls* are adamantly against it. And the *parents* are old enough to vote."

Adam resisted an urge to rise from behind his desk and deliver a comforting hug. "Don't give up, Lil. It takes time to change people's opinions."

"We don't *have* time. Even if there were more than three days left, it still wouldn't work. Look how the instapolls now predict you'll do in the election. And look how the media reacted to your speech!"

Adam winced. The tone of newspaper editorials and TV commentaries he'd seen ranged from the sarcastic ("After these space monsters get everyone to take off their clothes, next will they order us to bend over?"), to those accusing him of selling out to the enemies of the human race.

He shook his head. "I knew this wouldn't be a popular position. There are too many reasons why people won't want to do it. For most it'll be obvious ones like modesty, or religious and cultural prohibitions about going naked in public. But even places with weaker strictures against nudity aren't buying it either. When I phoned President Gedaulle, he said the French have sophisticated attitudes about the beauty of the unclothed human body, and didn't object to mass disrobing per se. However, no Frenchperson worthy of their great tradition of liberty, fraternity, and equality would do it because some inhuman foreigners ordered them to!"

"Aren't any world leaders supporting us?"

"No. When I talked to Lao Tzu, he just said China wouldn't tolerate any 'meddling in our internal affairs'. But I listened to Kalashnikov shooting off his mouth on the hot line for an hour. 'You're the only person who's seen these aliens. All we have is your word about their ridiculous ultimatum. How do we know this isn't a trick to make the Russian people look foolish when this Inspector comes—standing outside freezing, with snow up to our bare asses? Convince your own people to go naked first, then we might consider it!'"

Lil sighed. "I heard about your meeting this morning with the Congressional delegation."

"First time I've seen unanimous, bipartisan agreement on anything. They *all* think I'm a wimp, crazy, or incompetent. The 'honorable' Speaker of the House and the rest of the not-so-loyal opposition even broached the 'I' word if I 'don't show some guts and stand up to these space monsters'."

"They wouldn't dare impeach you! Would they?"

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"Who knows? Even my own party's ready to stab me in the back. They follow the instapolls too—and don't want to be dragged down with me come election time."

Adam's fist slammed the desk. "Idiots! Playing politics when the whole human race could be annihilated! Our only chance is to keep appealing directly to the public."

"That's getting harder. Many radio stations are still airing our 'Get Naked and Save the World' PSAs. But only the few TV outlets that traditionally show 'explicit' programs are running them. And most newspapers and magazines dropped our ads with the 'dirty' pictures after too many subscribers complained, canceled subscriptions, or threatened boycotts. Even *Playperson* and *Rooftop Apartment* wouldn't use them!"

"Probably because if everybody went naked, their business would go down."

Lil shrugged. "Our web site, www.washingtonexposed.gov, was popular when it first went on line. Then word spread its content wasn't racy enough—and hits plummeted."

"I thought your selection of nudes from famous paintings was very tasteful."

"*Too* tasteful. I should've known a typical Picasso rendition of a naked woman wouldn't appeal to John and Jane Q. Public's prurient interest."

"Isn't there *any* good news?"

"Well, those ads we placed in urban mass transit systems must be 'effective'. There's been a sharp rise in the number of flashers arrested in cities that didn't paint diapers and bras on the Renaissance nudes we used. And if you own stock in companies that make condoms, their sales are up."

Lil groaned. "Looks like we'll both be looking for new jobs soon—*if* the aliens don't exterminate us first."

"If they don't, I'm almost looking forward to being unemployed."

Adam sighed. "Being 'the most powerful person on Earth' is the world's loneliest job. Billions of strangers depend on me to protect them—especially from each other. Americans count on *me* to make sure they get the food, shelter, and medical care they need, *and* all the luxuries they think are necessities. They expect *me* to devise perfect solutions for complex problems like poverty, race relations, and violence that don't *have* ideal or simple answers. I've tried to do the best that's *humanly* possible—but whatever position I take or policy I set, it'll never be completely fair to *everybody*. All I can do is pick the ones that, on *balance*, do the most good and least harm—knowing that some people who don't deserve it will be hurt by them."

"That's unavoidable."

"True. But that's no consolation to me—or the innocent people I've hurt. Remember when I ordered those terrorist bases in the Republic of Quebec bombed? If I hadn't, those vicious cross-border raids into Vermont would've continued. But, to protect Americans, I had to act as judge, jury, and executioner for dozens of nameless strangers—including those poor mangled children they showed on TV, who'd done *nothing* to merit death."

Adam shook his head sadly. "Having good intentions and honestly trying do the right thing would be enough if I was only working on becoming a saint. But my job is to get good *results*. It's appropriate for people to judge me by the consequences of what I do—not just my motives."

He gestured towards the portrait of Washington at the opposite end of the room. "It's best if leaders do the right things *for* the right reasons. But those kinds of people are rare. Some presidents were personally honest—but mistakenly chose policies that proved disastrous. Others were callous and hypocritical in their private lives—but

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successful performing *public* duties. Overall, *that* kind might've been better for the country. Maybe the Bard should've said, 'The *good* that men do lives after them; the *evil* is oft interred with their bones.'"

Lil nodded toward the bust of Lincoln near Adam's desk. "I think you're in that rarest group."

"I wish! *I'm* afraid I'll be an honorable failure—and what's needed now is someone like Thomasina. *She* wouldn't be afraid to tell those aliens to kiss her *clothed* ass—even if it meant risking humanity's destruction. I've even considered resigning and 'passing the buck' to her.

"But I won't—because this *isn't* a Chamberlain vs. Churchill situation. It was wrong to appease Hitler, because he realistically could've been stopped at Munich by a strong enough show of force. But these *aliens* are so powerful, we wouldn't stand a chance opposing them. So, even if it means swallowing our pride—or losing an election—that's a small price to pay for saving the world."

Lil sighed. "I wish I could help make your job easier."

"You have. Just by listening."

A melancholy silence settled over the Oval Office and its two occupants like a warm comforter. Eyes closed, Adam rocked pensively in his chair—as if still pondering his presidency's greatest challenge. But instead his thoughts concerned a personal crisis. With doomsday perhaps three days away, should he finally tell Lil how he felt about her?

He hadn't appointed her his press secretary because of her looks. Her syndicated column was his favorite when he was a senator. And, long before they'd met, he'd seen how her Pulitzer Prize-winning exposé on Silicon Valley's cybernetic sweatshops aroused the habitually lethargic Congress into enacting swift reforms.

Lil's vivid Dickensian descriptions of how migrant computer programmers were exploited by greedy robber barons of the Computer Age were, in their understated horror, worthy of a Zola's righteous indignation. Chilling stories of programmers writhing in agony from repetitive stress injuries to their fingertips—their dreams of becoming concert contrabass players dashed—after being forced to work with outrageously obsolete twentieth-century keyboards. Or, at companies providing up-to-date tools, developing laryngitis after inhumanly long hours using voice recognition software.

Incensed by such sordid injustice, both houses introduced bills to penalize the offending corporations. But after high-level, all-expenses-paid meetings with the latter's lobbyists in Las Vegas and the Riviera, Congressional leaders worked out a compromise. Three billion dollars were voted to the companies to supply their programmers with gloves and cough drops. The repentant businesses showed their gratitude for being shown the error of their ways by contributing generously to the incumbent legislators' reelection campaigns.

Such impressive skills as journalist and muckraker made Lil a prime candidate for his administration. But Adam was completely unprepared for the effect she had on him in person. From his first sight of her—the jolting tingle he felt when they shook hands—the interview questions he'd intended to ask were forgotten. Never had he encountered a woman who combined intellect, social consciousness, and voluptuousness so stunningly. Like Helen of Troy reincarnate, she was so glowingly gorgeous—so incandescently ravishing—every time he looked at her he couldn't believe she was real.

Yet though he discovered there was no Menelaus or boyfriend in her life to complicate matters, their relationship remained prim, professional—and pla-

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tonic. Like her, he'd never married. And, mindful that some of his predecessors' tawdry flings had damaged their presidential effectiveness and reputations, he'd reluctantly vowed to remain celibate while in office. It wasn't an easy decision. Countless nubile women might jump on the chance for instant tabloid fame and lucrative deals for tell-all books by sharing his bed.

But his private pleasure would come at the price of public scandal. Even if his partners remained discrete, too many people would love to catch him *flagrante delicto* to keep it secret. Even if he matter-of-factly confirmed his lusty liaisons, saying they were nobody's business but his own, so many voters and political enemies would be (or pretend to be) shocked and offended it'd be a terrible distraction—crippling his ability to govern. Curiosity about his favorite sexual positions would overwhelm the public's interest in his positions on less titillating issues, like soybean price supports or sending foreign aid to Uzbekistan.

Besides—despite many private late-night meetings in this office, Lil had never shown any interest in being more than his loyal press secretary. When she left, he'd sometimes sit in the chair she'd vacated—basking in the fiery warmth her body left behind in the seat cushion. Fantasizing about them occupying the chair simultaneously, in face-to-face conjoined embrace.

If a lawyerly Mephistopheles guaranteed she'd return his feelings, and their affair would forever remain hidden from inquiring minds, he'd willingly thrust away his ambivalent bid for sainthood. He'd hardly be the first politician to sell his soul—

Adam's reverie ended with eye-opening shock as something electrical brushed his hand. Lil had silently risen from her chair, and touched her eternally feminine fingertips to his. Like a song without words, their pulses intertwined in a delicate stretto. Unheard melodies danced in their countenances as their smoldering eyes longingly embraced in a tense waltz. The counterpoint of their individual feelings and desires suddenly harmonized into perfect Gregorian monophony.

Lil's ruddy lips moved closer to his—as if to whisper an intimate secret to him. He could taste the honeyed wintergreen mist of her breath—cherubic offspring of her favorite breath mints. As she leaned forward the front of her blouse drifted downward, revealing an incendiary glimpse of cleavage.

Suddenly he recalled a quotation learned subliminally during a college class he'd napped through. *Stay, moment, stay, thou art so fair—*

"Are you two preparing to mate?"

Lil jerked her fingers away and whirled around. She shrieked and stumbled backwards supine onto the desk, legs held high for a moment, then rocked back to a standing position.

The naked alien sitting in the chair she'd vacated brushed his fur back over two small horns on his head. "I will be happy to wait until you finish your mingling of bodily fluids."

Pale face fixed on AMD's monstrous form, Lil slid along the edge of the desk until she stood beside Adam.

The latter croaked, "No, we were . . . discussing your suggestion about the Inspector."

A sextet of slimy eyestalks stiffened quizzically. "Pardon my error. Many sentients across the Galaxy have, like you, two sexes. Despite wide variations in size, shape, and location of reproductive organs, all preface actual joining of those body parts with highly stylized preparatory behavior that takes much longer than the act itself. The potential partners engage in ritual eating, drinking, dancing, presentation of gifts, and participation in mutually enjoyable nonsexual activities. This

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eventually culminates in presentation of neurologically sensitive tissues to each other for biting, sniffing, stroking, licking, and osculation. I thought I recognized you performing such stereotypical precopulative activities when I arrived."

AMD's corpulent body quivered. "I believe your term for these activities is 'foreplay'."

Adam wondered if the alien recognized what the warm rush of blood to Lil's face meant. He said, "We've tried to convince our people to do what you've asked. But, as I warned you, few plan to do it."

"My colleague, RAH, informed me of your opinion. Most regrettable. While we cannot be certain what the Inspector will do when presented with your fellow humans' intransigence, I suggest you tell them to initiate whatever traditional religious, cultural, or social ceremonies they use to prepare for death."

Like a living subwoofer, from deep within his thoracic cavity AMD began humming a nearly subsonic version of the *Dies Irae*.

"No! We're not dead yet!"

Adam looked up at Lil. The fear was gone from her face—replaced by a strength that made her more alluring than ever. She pointed an accusing finger at the intruder. "You six-eyed alien freaks got us into this mess—and you should be responsible for getting us out! Adam's told me you won't address our people yourself, though that's the best way to convince them. If you won't, at least tell us what *you* think we should do!"

Doubting their visitor would find the expression "six-eyed alien freak" politically correct, Adam braced himself to receive the disintegrator ray that would send Lil and him into eternity together. But instead of angrily extracting a Blastomatic 5000 from a hidden holster, the creature's features turned pensive.

"An interesting problem. If your species had a hive mind, a single thought from you—their Supreme Leader—would suffice for instant obedience. Or if your world's political system was more sophisticated, and you had the power to have anyone who disobeyed you tortured or killed—there also would be no dilemma. Even if your fellow humans were sufficiently intelligent to understand the logic, wisdom, and prudence of disrobing for the Inspector, they would voluntarily do it. However, since clearly none of those situations apply, I can only give you this advice."

Adam frowned. "What's that?"

"You must lead by example."

Lil gasped as the alien stroked his teleportation control and vanished. "Some help *that* was!"

"Maybe our furry friend's right."

"What do you mean?"

"We used the wrong approach, Lil. Using the media to get our message across was doomed from the start. People are constantly bombarded by words and pictures from radio, TV, holos, billboards, newspapers, magazines, and the web. Once the sideshow novelty of those aliens' landing wore off, we were just one tiny voice competing among millions of others screaming for their attention. Compared to the slick ads, raunchy TV shows, and gossipy tabloids they're used to, we weren't entertaining, titillating, or frightening enough to keep the average person's interest."

Adam scowled. "Even if Six-Eyes had addressed the U.N., he'd probably have been a one-week wonder. He'd start with solemn interviews on CNN—and end as a guest on sleazy daytime talk shows, discussing what his species used for sex toys. And if he preached doom and gloom if everybody didn't strip for the Inspector—the public would change channels that much quicker! Even his appearance wouldn't scare anybody for long. Compared to

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monsters in holos and videogames, he's almost cuddly. Just somebody in a latex suit, vying for first prize at an SF convention masquerade."

"But what else can we do?"

"We need *action*, Lil. Something so dramatic it'll force people to pay attention. We *do* need to lead by example."

"How?"

Adam smiled. "Maybe the simplest approach is best."

"You're sure you want to do this?"

"I have to, Lil."

Outside, velvety night descended across Washington. At the other end of the Oval Office, Lil adjusted the microcam and teleprompter Adam, seated behind his desk, would soon use to make the most important speech in human history.

Adam brushed lint from his blue Armani suit. "Have you heard of any leaks about what I'm going to say?"

"No. I did all the video editing and programmed the teleprompter myself. Only you and I know about it. And we're *both* good at keeping secrets."

The digital clock on his desk flashed *to one minute before airtime*. Lil pecked his cheek. "Good luck."

As she left, Adam gently touched that sacred spot on his face. Had he glimpsed a sparkle of anticipation in her eyes?

A chime interrupted his fantasies. *Showtime*.

His expression metamorphosed into solemn dignity. "My fellow Americans, and citizens of the world. Four days ago I came before you to relay the personal message given me by our visitors from space."

The view on the monitor changed to show the saucer outside—ominously illuminated by searchlights. "Many of you have patriotically promised to obey their request. You plan to honor the Inspector coming in three days by greeting her in the nude—nobly sacrificing your modesty for the good of humanity."

Adam loosened and removed his silk tie. "But most are still undecided about doing it. Let me show you why you *must* make the right choice."

The monitor switched to an old film clip of an H-bomb test. As its swelling globe of annihilation vaporized an unnamed Pacific island, Adam intoned, "This is the greatest destructive force humans have harnessed. But, compared to the awesome energies these aliens have mastered—powerful enough to propel their starships through uncharted space—our efforts are like children playing with matches."

As the microcam switched back to him, Adam stood up behind his desk, removed his coat, and laid it over his chair. "But though they do not seek our destruction, we have been warned that a terrible fate awaits us if we deliberately insult their soon-to-arrive emissary."

Scenes of floating triangular machines spraying crimson death rays across early-1950s Los Angeles exploded on the monitor. "All this can be avoided by a simple gesture of respect. Something we do every time we bathe—or make love."

The microcam tracked Adam as he walked in front of his desk, sat on the edge, and removed his shoes and socks. "No, what we're being asked to do is easy. Perhaps you are thinking, 'But what if I'm the only one who does it? Won't my friends, family, neighbors, strangers—even my dog be shocked or make fun of me when I stand stark naked in public?"

As the president unbuttoned his shirt, across the world channels changed, TVs flashed to life as news of his speech spread by word of mouth, telephone, and online chat room. By the time his shirt lay on the desk and his athletic chest stood bare, viewership had swelled by millions.

Adam forced a smile. "Yes, a lone

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person parading nude when everyone else is dressed *would* stand out. It'd be natural to feel self-conscious doing that. But if we all strip *together*, forming an anonymous crowd of unclothed bodies—a great communal celebration of nudity—we'll all be equal. No one can laugh at your birthday suit when that's all they're wearing themselves. Surely you can bear up and go unclad for the short time the Inspector stays on our world."

As a billion eyes stared fascinated at the spectacle on their TV screens, Adam undid his leather belt and slid it from his pants. "To begin this task and inspire everyone to comply, I am issuing the following executive order. Effective tomorrow morning at 8 A.M. E.S.T., all employees of the federal government, including our armed forces, are prohibited from wearing clothes. Until the alien Inspector arrives, exceptions to this order will be made only on a case-by-case basis for those individuals, like surgeons performing operations and jet pilots, who need protective coverings. While she is here, anyone who for health or other reasons cannot go nude should stay indoors where she cannot see you and be insulted.

"I am also asking local and state governments to suspend all laws prohibiting public nudity. If necessary, National Guard troops will be sent to communities who harass public-spirited individuals complying with my suggestion to go bare."

The Chief Executive unzipped his pants, stepped out of each leg, and hitched up his underpants. "My authority to do this applies only to this country. For those viewing me elsewhere in the world, I can only plead with you and your leaders to follow my advice. Don't put your lives at risk from the Inspector's wrath by a stubborn pride. Don't threaten humanity's continued existence by preferring meaningless martyrdom to a temporary suspension of traditional sensibilities. We all came into the world naked. Let us preserve Earth's future by doing it again.

"Finally, I would never ask anyone to do something I wouldn't do myself."

With a firm two-handed stretch of their waistband, his sky-blue boxers flapped to the floor.

"Good night—and thank you for watching."

Within the maroon saucer outside the White House, two unearthly beings viewed the president's presentation on their triangular interocitor screen.

RAH chirped, "Ingenious display."

AMD clicked, "An effective way to make his point."

"Do you think these humans will be ready when the Inspector arrives?"

"Let us hope so. The alternative is too terrible to contemplate."

Oswald Slonen sprawled in his recliner, snoring. His dangling fingertips nearly touched the well-thumbed centerfold of *Newstime*'s latest issue, lying askew beside him on the floor.

Harriet ignored her sleeping spouse and concentrated on the television screen's life-sized images. She yelled at the back of the trailer, "You kids stay in bed!" ("But Ma, it's the president!")

Then, quietly, "Play." The TV silently repeated its recording of tonight's speech from the White House. As those last few seconds of the Chief Executive standing au naturel ended, she said, "Reverse play, 1/5 speed."

Like magic his underpants slithered deliberately up his legs unassisted. Pants, belt, shirt, socks, shoes, coat, tie—all resumed their proper places in slow motion.

"Repeat—normal speed."

The striptease resumed till its climactic moment.

"Freeze."

For a long time Harriet stared at the

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Sim-3-D, high-definition still frame of the president. Then she sighed, changed the channel, and murmured disappointedly, "I always thought he was bigger than that."

The next day, an old forlorn figure sat on a bench in Central Park in warm noonday sunlight. Clutching his long overcoat tightly around him, all he had left was to dream of past glories. For when they'd released him from jail this morning, he'd entered a world gone mad.

There were still nostalgic traces of normalcy around him. Young executives in custom-made suits chattering into cell phones. Cyclists in shorts and halters pedaling with dangerous abandon around terrified pedestrians. Vendors selling hot dogs, whose new owners cursed the dripping mustard soiling their stylish slacks.

But there were also sights of unspeakable obscenity. Youthful joggers ran past him wearing nothing but sweat and sunscreen. Strolling musicians played protest songs from the 1960s for donations—covered only by strategically placed guitars. Even oldsters like him ambled by with jiggling bellies and flailing flesh completely exposed.

Ever the optimist, when a naked top-heavy young brunette bounced by, he jumped up and flung his coat open. But instead of squeaking so delightfully like that innocent young thing on the subway the other day, she laughed at him.

Rejected and dejected, his occupation gone, he murmured, "O tempora, O mores!"

For a world where nothing shocked wasn't worth living in.

Adam sat at the head of the conference table as the members of the National Security Council filed lugubriously into the room. He remembered smirking as a high school freshman when his speech class teacher repeated that hoary trick to calm your nerves during public speaking. *Imagine your audience is sitting there naked.*

Only this time they *were* all naked—and he was still nervous.

The fact he was nude too didn't help. It'd take more than two days to get used to being perpetually unclothed. But, with the Inspector due to arrive tomorrow morning, one way or another he wouldn't have to stay bare much longer.

A nymphlike vision of loveliness dashed in and sat agonizingly close beside him. Lil whispered, "Sorry I'm late."

"No problem. Thomasina's late too."

Adam strained with eremitic fortitude to avoid looking at Lil. Mindful of his need to concentrate on official duties during this crisis, she'd arranged her long hair to cover her most gorgeous paired feature. But glimpsing the rest of her stunning undraped body was maddening too. His aroused lips and arms might (barely) be under voluntary control—but his most painfully frustrated reflex wasn't. So, during their private meetings together, he kept his legs crossed, sat scrunched behind his desk—or covered his lap with enchanted papers that magically levitated.

The vice president strode regally into the room. Ignoring the jealous eyes glaring at her, Hobbes said, "We can start this meeting of the Washington Urban Sunbathers Society now."

She smoothed the thick folds of her magnetic blue suit, then played with the ruffles of her ivory blouse. Her gesture of defiance against his order requiring full federal nudity easily trumped those of the NSC's other members. Castillian, who always used contacts, now wore masklike goggles. Noseblower's hard-won military ribbons and medals were glued to his bristly chest. Dunn's chihuahualike pate sported an astounding toupee of

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scraggly dreadlocks hanging down his back. And Caven wore a wig whose silvery artificial plaits, like Lil's natural ones, draped her bosom—though in her case there was little worth hiding.

Adam said, "Let's hear your reports."

Castillian scowled. "Besides your two close encounters with them, there are still no confirmed sightings of the aliens outside the saucer. However, my agents have worked round-the-clock tracking down innumerable false alarms. Every large, furry space monster reported so far turned out to be a prodigal husband stumbling home from a bar late at night, somebody who meant to say they'd seen Bigfoot—or teenage pranksters who wanted to see if we really do wear black suits."

He paused. "We *used* to."

"Anything else?"

"Thank you, sir, for letting our operatives in foreign countries retain their clothes till tomorrow. The spy business is hard enough without having anywhere to hide standard-issue gadgets—like flame throwers disguised as pencils, and marble-sized grenades—except in places the Sun doesn't shine. And you can't be inconspicuous when the locals are staring at your flapping hairy—"

"You're welcome."

Caven said, "Diplomatic efforts have failed. With their severe overpopulation problems, countries in Africa and south of the Rio Grande are afraid what universal nudity for even a day will do to their birth rate in nine months. In the Middle East—reactions ranged from 'We don't do that sort of thing', to you being declared 'The Great Satan, Squared'.

"Europe, Asia, Australia—either apathetic, or saying it's too damn hot or cold there now to go outside without clothes."

Adam grimaced. "What's the military situation?"

Noseblower grumbled, "Our armed forces remain on high alert. But there've been terrible discipline problems everywhere they've implemented your 'nudity when feasible' order. Besides the obvious ones on ships and bases with both sexes, you realistically can't have soldiers training in a mosquito-filled swamp or stationed in Alaska do without clothes. Even limited implementation has damaged our readiness to respond to terrestrial threats—much less hostile aliens!"

"Well, keep as many troops as possible confined inside their barracks, where the Inspector can't see them."

Dunn glowered, "You're assuming these aliens' technology can't see through walls. Maybe they have an ultrasophisticated X-ray system that'll ferret out anybody, anywhere who's not naked!"

Caven sighed. "Even if they don't, we're still doomed. I estimate 3% of people outside the U.S. will be naked tomorrow—leaving over six billion clothed ones this Inspector will think are insulting her!"

Thomasina's arm angrily swept the room. "That just proves all this is a pile of bull. Face it, people. It ain't gonna work."

Lil piped in, "We're doing better domestically. Today's instapolls predict 6% of Americans will go bare. Even several religious leaders endorse going naked. The Reverend Merle Gantry's telling his followers the Inspector isn't an alien, but God Himself. He's 'coming to destroy all of mankind's sinful cities and wicked science'—then turn the whole Earth back into the Garden of Eden. After He restores the 'primal innocence' humanity lost with the Fall, everyone's supposed to go naked, without being ashamed."

The VP snorted. "That's idiotic! Besides, how many Americans would really want to spend day after endless day just tending a garden, eating fruit, and playing with cute animals? Even if Milton was right and there's still sex in

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Paradise, life without TV, cars, and junk food would get boring as hell mighty quick!"

"Even if it's for the wrong reason, he's telling people to do the right thing."

"*Is* it the right thing?"

Thomasina glared at Adam. "How do we know this Inspector's coming? That she really wants us to be naked? Or that she has the power to wipe us out if we don't?"

"That's what the aliens told me. I have to assume they're telling the truth."

"And would you've believed them if they said they were the Easter Bunny and Winnie the Pooh—and the Tooth Fairy was coming to pick up the list of toys you want from Santa Claus?"

The VP's eyes swept around the table. "Look at us. Most of us are lawyers. We're all veteran politicians. We all learned ages ago that you *never* take what anyone says at face value—you never trust anybody completely. People smile while they lie to your face. They twist the truth, pretend to be fair and reasonable when they're really trying to figuratively—or literally—screw you or somebody else. No matter what they say, always assume they're really motivated by greed, prejudice, grabbing power over other people, and selfishness—and you'll never be disappointed."

Adam frowned. "That's too cynical."

"It's realistic. Not everybody *is* like that—but it's prudent to assume they are. And, considering how corrupt and morally bankrupt we humans can be, why should these two aliens you've talked to be any different? Why should they be plaster saints when we aren't? Their real motives may have nothing to do with helping *us*."

Noseblower nodded. "Right. Maybe getting everyone naked is a ploy to soften us up for an invasion. Their starships' troopers might attack so fast, by the time our soldiers get their uniforms and battle gear back on it'd be too late!"

Caven rearranged her wig. "Or a plot to undermine this country's leadership. Clothes really do make the person. Look at us seniors. Without our uniforms and power suits, we look like dried up, potbellied couch potatoes with saggy butts who nobody's going to take seriously! Even you, Mr. President, who still looks good—*very* good—loses respect undressed. Media pundits have renamed you 'The Chief XXXcutive'. You're 'the first president who doesn't have any dirty laundry—or any laundry at all'. They're calling your administration 'The Prurient Presidency'—and suggesting the Marine Band shouldn't play 'Hail to the Chief' for you, but 'The Stripper'!"

Dunn twirled a dreadlock. "Maybe these aliens are trying to destroy our economy too! If people started to like going naked all the time, think of what it'd do to the fashion industry, haberdashers, and lingerie makers! The drop in sales of adult videos and magazines alone might plunge us into a depression!"

Thomasina snickered at Adam. "Not necessarily. I'm told sales of condoms skyrocketed after your speech the other night. One company even sent you a complimentary case of them for doing such a great job promoting their business!"

Castillian's face darkened. "Perhaps they want us all naked to better pick out the people who look healthiest and well-fed. Maybe this Inspector is a—meat inspector!"

Caven cackled. "'To Strip Man'."

She lifted flabby corrugated skin from her arm, and gazed meaningfully at Lil. "They won't want somebody who's old and tough like me. But if I had as much prime rib as you, my dear, I'd be worried!"

Adam turned to Thomasina. "Do you really think the aliens want to do any of this garbage?"

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"Probably not. But it proves my point that their motives might not be what they say."

"What would you do if you were president?"

The VP's chocolate face hardened. "I'd meet this Inspector fully clothed—and greet her with the same courtesy and consideration you give any head of state or foreign dignitary. If she gave me lip about being insulted because the human race wasn't naked, I'd tell her that's not our way—and just as I'd respect her race's customs if I were visiting her planet, when she's on Earth she damn well better respect ours!"

"And then she'd blow up the world."

"Maybe. But we're all going to die someday—we just don't know exactly when. And, with humanity still stuck on a single planet, who knows how long the human race itself will exist? There're still enough nukes around to start World War III. Maybe an asteroid will hit us tomorrow.

"But while we're alive, some things *are* under our control. We can decide what's important to us, we can choose to try our best to live ethical, responsible, productive lives—and, if necessary, decide what we're willing to die for. Even if this Inspector wipes us out, I'd rather die free than live like a whipped slave cowering before Massa!"

Adam's shoulders sagged Atlas-like. "If it were only my life at risk, I'd feel the same way. But with humanity's whole future at stake . . ."

His pleading eyes panned the room. "Any other ideas? No? Well, thank you for coming."

Everyone except Lil filed out. As they left Adam blinked at Castillian's receding backside. Somebody really should tell him he had a large piece of toilet paper stuck to his butt.

"What are you going to do, Adam?"

Lil's hand rested on his. There was a little sex in her touch—but mainly simple caring. He groaned, "Follow Thomasina's advice. We can't get enough people to go naked tomorrow anyway. I told that alien the first time I met him we couldn't do it. Should've listened to myself."

His other hand enfolded hers. "I tried to be reasonable, and compromise. Had to do that a lot as a senator—and president. Water down a bill, or sign one with provisions I didn't like just to get some parts I wanted passed. But sometimes you have to draw the line, say 'No!'—and let the chips fall where they may."

He sighed. "Time to put our clothes back on—and get ready for doomsday."

Lil's hazel eyes smoldered at him. "Don't be in a hurry to get dressed. If we're going to die tomorrow, there's something we should do tonight—"

"Excuse me, are you preparing to mate *this* time?"

Adam scowled at the shaggy monstrosity who kept dogging him at the worst possible times. Seated at the far end of the table, RAH said, "My colleague, AMD, informed me of his embarrassing interruption of your copulative cycle during his conference with you. I can teleport back to our ship until you complete this attempt."

"No . . . don't. I've something to tell you."

"I hope, Supreme Leader, you have convinced your fellow creatures to bare their bodies for the Inspector. Hir starship will soon enter orbit. S'he will then teleport to our craft, and meet with you and your underlings tomorrow afternoon."

"We'll greet the Inspector. But we won't be naked."

The alien's serpentine eyestalks writhed fretfully as Adam explained his decision. "Most distressing. You have never seen what Annihilator ships do to a planet. *I* have. At lowest intensity, their energy beams melt solid rock. Slightly more power—and this build-

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ing instantly turns into plasma. Still more—and your oceans boil. However, considering their direct effects on organic matter, all humans will be vaporized long before that event occurs."

RAH winked. "Of course, you could protect your world from the Inspector's wrath if you had a Level XV omniplanetary force field generator."

Adam frowned suspiciously. "And how much would it cost to buy one from you?"

"We would be glad to loan you one for free."

"Why didn't you tell me—!"

"Unfortunately, we do not have a Level XV generator. Our ship only carries a Level II—sufficient to protect against thermonuclear explosions, but useless against Annihilators."

Lil screamed, "It isn't fair! We humans are intelligent beings. We have a right to live! It'd be horribly unjust for this Inspector to commit genocide because she doesn't like the way we look!"

"You refer to several quaint metaphysical concepts common to primitive civilizations. 'Fairness', 'rights', 'justice'—such ideas are useful only to the weak and defenseless, not the strong. The Inspector has the power to judge and destroy you. If s'he wishes to eradicate you, s'he will. If s'he decides not to, s'he will not. That is the only reality. Your only option is to obey hir whims—and hope s'he spares you."

Adam whispered, "There's no possibility of bargaining or reasoning with her?"

"No. Why should there be? S'he is strong, you are weak. Nothing else matters."

Lil bit her lower lip. "Maybe there's another way. How long will the Inspector stay here?"

"Less than one day. S'he has a busy schedule—and rating your planet is among hir least important duties."

"Then maybe she won't have time to check whether everybody on Earth is naked."

"S'he would have no reason to do that. If all the humans s'he sees are unclothed, s'he should be satisfied."

Lil clapped her hands. "That's it! All we have to do when she arrives is keep her at the White House! If everyone here is naked, it won't matter what people in the rest of the world are doing!"

RAH's chair creaked. "That will not be sufficient. The Inspector will spend little time in your company. S'he will stay almost exclusively within our ship—reviewing data we acquired concerning your history, biology, artistic and scientific achievements, and cultures. By accessing the modulated electromagnetic transmissions you call radio and TV, and especially your 'web' of computer databases, we prepared a summary report on your world s'he will find most helpful."

Adam frowned. "Then what's the problem?"

"When the Inspector 'watches the boob tube' and 'surfs the Net' at our ship's information terminal, s'he will surely see images of clothed humans. That alone would have highly undesirable ramifications."

Lil said, "If you help us, maybe we could convince her humans *always* go around naked. Adam, you could order every TV station and satellite system in the country to shut down while the Inspector's here. Then there'd be no broadcasts of clothed people for her to see. Even foreign governments would probably cooperate. At least it's easier than convincing seven billion people to strip!"

Adam stroked his chin. "We have computer software that blocks access to information and pictures deemed inappropriate for children. Could you work with our programmers to install a similar system that censors images of people *wearing* clothes?"

RAH quivered. "We can create such

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a filter ourselves. But the Inspector will become suspicious if there are no live television transmissions for hir to review, or images of humans on your 'Internet'. Species like yourself with more than one gender always devote much energy to creating and viewing depictions of members of their kind who are aesthetically pleasing—what you call, 'sexy'. If s'he sees none, s'he will surely ask why."

Lil smiled. "Oh, humans produce plenty of material she'd find suitable for viewing. You know what I mean, don't you, Adam?"

"Yes . . ."

The NSC reconvened that evening.

Adam began, "Thank you for coming. Normally, I'd delegate a task like this to our staffs. But because humanity's very future depends on doing this job perfectly, I feel it's our responsibility to do it. 'If you want something done right' . . ."

Dunn nodded. "No sacrifice is too great for the good of the country."

"Right. You and Noseblower start working on these magazines. Tear out all the articles and any pictures that would offend the Inspector—but leave the ones we want her to see! And thank you, Admiral, for donating your private collection. It must've taken you decades to acquire it."

"It's my duty, sir. Besides, once they've served their purpose, maybe the aliens can give my magazines back to me. The *good* parts'll still be in them."

"Castillian, Caven, I want you to edit that pile of videotapes and DVDs."

The Secretary of State whistled. "Look at the size of it! How'd you get that many?"

"The Secret Service went down and bought a local store's entire inventory. Any questions about how to work the equipment?"

"The—oh, *that* equipment. No, sir. The technicians showed us how to dub from the player to the recording system when we see the appropriate sections on the TV monitor."

"Good. Just include the kinds of scenes we talked about! Lil, you'll work with me."

"*Yes*, Mr. President!"

"We'll review and edit these other tapes and discs."

The press secretary's face fell. "Couldn't we do something different? My office—you know, with the mirrors on the ceiling—has a microcam recording system—"

Adam crossed his legs tightly. "No, business before—I mean, we have too much work to do if we're going to have enough material for the Inspector to see. We'll be up all night as it is."

Noseblower unfolded one of his favorite magazines, fondly stroking the glossy paper. "We'll rise to the task, sir. It's a dirty job, but somebody has to do it."

Lil sighed stoically. "Isn't Thomasina coming to help us?"

Adam winced. "No. She wasn't ecstatic about the idea."

He rubbed his ear—still ringing from his VP's last screamed sentence before she slammed her telephone handset down.

"You're going to save the world—by using *pornography?* "

At 2:58 P.M. EST the next day, Adam stood shivering on the White House lawn. One of the aliens popped into his bathroom that morning as he took another cold shower to inform him the Inspector had teleported into their saucer. She was currently reviewing data concerning their planet—and wished to meet the "Supreme Leader of Earth" at 3 P.M.

Shuffling his feet about seven meters from the apple-red saucer, he waited nervously for the meeting that would decide humanity's fate. Behind him a crowd of reporters and government officials huddled together for warmth.

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Normally, it would have been a pleasant, sweater-or-jacket fall day. But with everyone here naked, they were grateful whenever the Sun peeked from behind a cloud. That cup of steaming coffee he'd downed a little while ago helped temporarily. But now it was having a delayed effect that gave him another reason to hope his meeting with the Inspector wouldn't last long.

He looked over his shoulder and saw Lil. She was easing away from the dishonorable Speaker of the House, who was trying to huddle with her much closer than necessary. Waving at Adam, she called, "Good luck!"

Suddenly her face froze in horror. Adam turned around—and nearly committed an execrable breach of protocol. The two aliens he'd worked with had initially looked horrifying. But, eventually, familiarity made them seem no more inhuman than most politicians.

Unfortunately, he'd forgotten to ask what a *Gorgiasian* looked like. Staring at her from two meters away, his brain couldn't link her with anything familiar—couldn't process her appearance into something his mind could conceive without going mad.

She was more a . . . *nothing* than a thing. An undulating inky-black void three meters wide and tall—convulsing like a manic amoeba. No limb to shake, no eye to look into . . . how did you greet something vomited up from the deepest tar-black pit of Hell?

Waves of cold frigid as outer space itself wafted at him from the ultramondane emissary. Paralyzed, he waited for this chthonic fiend to slither suffocating pseudopods out at him from her acid bowels—dragging him back into her maw to fall forever, screaming for death to end his agonies—

"Awe you the Supweme Weader?"

Adam instantly regained his senses. Though the Inspector remained fathomlessly alien in appearance, a voice that sounded like Elmer Fudd's *was* something he could comprehend.

"Yeth—I mean, yes."

She rose slightly into the air, peering over his shoulder.

"And these others are your undawings?"

"My—oh, *underlings*. Uh—yes."

"I have weviewed the infowmation the two agents pwovided me. Is it twue you humans wetain your native appearance at all times?"

"You mean—do we always stay naked?"

"Yes."

This was humanity's moment of truth. The Big Bang. The formation of the Milky Way, Sol, and Earth. The evolution and first glimmers of intelligence in some arboreal primate. The struggles and dreams of billions of past and present humans—and those who might one day travel to the stars. All hinging on the next words he spoke.

But at the last instant Adam hesitated. What if he lied—and the Inspector discovered it later? What if she already knew the truth—and was testing him to see what kind of moral character humans really had? Maybe it wasn't too late to confess, perhaps avoid a terrible vengeance—

Or maybe not. "We do stay naked."

"I bewieve you. All the infowmation I've seen is consistent with that."

More confidently, the president asked, "Have you decided about our world's status?"

"Not yet. I anticipate finishing my wesearch soon, then finalizing my wecommendation about your pwanet. You humans will be dealt with vewy appwopwiately."

That sounded ambiguous. "I hope nothing we've done has insulted you, or earned the severe punishment we're told you can inflict."

The Inspector seemed shocked. "You mean Annihiwator ships? Oh, no, Supweme Weader! That would be cwuelty to humans! I swear by the Gweat Pupa of the Cosmos, I will

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arrange for you and your subjects to have all your gweatest hopes and dweams come twue!"

Adam blinked. The coal-black void before him was gone.

"Mr. President, Mr. President!"

As he turned around cameras flashed, reporters mobbed him shouting questions until Secret Service agents peeled them away. Lil's clarion voice rose above the frustrated media mavens like Gabriel's trumpet. "I'll arrange a press conference in the East Room in one hour. You can ask the president any question you want then!"

Minutes later, Adam and Lil stood alone by the crimson saucer. The tall fence flanked by discretely concealed Secret Service agents, the towering trees and lush vegetation, the cool breeze caressing their bodies—if there'd been an apple tree nearby, it would've seemed like Paradise.

Lil smiled. "Adam Tremaine, you've just saved the world. What are you going to do now?"

"I'm going inside where it's warm!"

"I can think of a place that's *hot*. Remember that scene last night in 'Foxy Firefighters'?"

"You mean the one with the hose—"

Adam's hands descended modestly to his groin. Where was a fig leaf when you really needed one? "Please don't remind me. Remember, today *isn't* doomsday. Don't quote me, but the American public's so fickle, saving the world still might not get me re-elected next week! And—at least while I'm president—I have a greater responsibility to the country than myself. That . . . limits what I can do."

Lil brushed long shimmering hair away from her breasts. "You *think* too much, Adam. You're not helping yourself or the country by making yourself miserable. Sometimes you have to do what your heart says you should. Though it doesn't hurt to be a little practical."

"What do you mean?"

Her voice turned husky and serious. "Mr. President, may I have a private meeting with you in the Oval Office after the press conference? It concerns your position on stimulating rising sectors of the economy, and penetrating new markets."

"Huh?"

Leaning forward on tiptoes, she whispered warmly in his ear, "In other words, I found that complimentary case of condoms."

"Are you satisfied, Almighty One?"

The Inspector's compound eyes stared at the interocitor screen within the saucer—engrossed by the meticulously edited video signals beamed directly from a transmitter inside the White House. After repeatedly viewing those rapidly moving sequential images of hyperactive naked humans mating, s'he finally recognized the anatomic differences between "females" and "males". Following intense study of the heavily censored pictures hir hosts downloaded, and those crude chemically-produced portraits imprinted on cellulose fibers, s'he even understood what sizes and shapes of fat and erectile tissue earthlings considered attractive.

Finally s'he said, "It's astonishing how many modes of copulation these cweatures have!"

RAH replied, "Yes. Their interest and inventiveness in such matters is unequaled in the known Galaxy—even among species with more than two sexes."

The Inspector telekinetically flipped open a thinned magazine resting nearby—revealing Miss December, 2019, in all her natural blonde magnificence. "Why do humans bother cweating such art or these dynamic images, when they need simply travel to—the phrase you used was, 'singles bars'?—to see such sights 'in the flesh', and se-

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lect fwesh sexual partners?"

AMD said, "Because, at times, members of the preferred gender are not immediately available. This has traditionally been the case with humans assigned to ships and submergible vessels in their oceans. Such artwork helps relieve their tension until real partners, called 'hellosailors', are available again."

RAH pointed an eyestalk at the magazine. "These images are also popular among young males recently achieving sexual maturity. This culture generally discourages indiscriminate mating by them, so they can better concentrate on learning during a phase of their education called 'high school'. Such pictures assist their physical and mental health during that difficult time by acting as a surrogate for actual mating partners. Typical of these humans, however, this attempt at suppressing their natural behavior often fails—actually stimulating 'teenagers' to seek out receptive females. Especially when societal prohibitions disappear during their next educational phase—'college'."

"So these humans at least twy to suppress sexual desires a little!"

AMD looked inquiringly at RAH—his fellow native of Callicles IV. "Only a little. Their peculiar biology makes it impossible for them to do more. The healthy mature male is perpetually prepared for mating activity—except immediately following copulation, when he promptly falls asleep."

RAH added, "Females remain ardent for mating even *after* the male has lapsed into dormancy following sexual union—a curious, apparently problematic behavioral anomaly. 'Women' are unavailable for procreation only while giving birth, and during certain recurrent biologically-mediated periods."

"Isn't there a special term for those times when females are stwictly 'off limits'?"

"They are called, 'headaches'."

AMD continued, "After examining these images and data, you understand now why humans actually revel in their nakedness. Staying uncovered at all times allows their adult members to be continuously aroused and available for the sexual activities they consider the prime purpose of their lives."

"Don't they even cover the very young and old of their species, to pwotect them fwom cold and injuries?"

"They do clothe their children—primarily for hygienic reasons. And they cover those so elderly that to leave them nude would be aesthetically objectionable. Notice that the images you have viewed do not show those particular groups. Since they are not generally considered suitable for sexual activity, humans who *are* have little interest in them."

The Inspector ruminated, "With their wevel of scientific knowledge and economic development, they *could* make enough gawments to clothe all of their kind."

RAH answered, "Yes. But, as you see, they deliberately choose *not* to. Now that their technology has made it possible to feed and shelter their entire race, the major motives driving them to new scientific and industrial advancements are to give them more leisure time to dévote to copulation—and to invent better aids to facilitate it. They create faster, sleeker ground vehicles to attract more sexual partners. New scents and facial markings to enhance natural attributes. And especially devices to play the instructional material on advanced mating techniques you have studied on the interocitor."

"Based on what I've seen, I'm amazed those humans I met thwee diors ago could westrain themselves for so long. I'd have expected them to begin indiscwiminate mating while I spoke with their Supweme Weader!"

"That was probably because there was an insufficient number of females among them. Also, in their political

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and economic systems, those with the greatest power reserve the choicest sexual partners for themselves. Why, in our tentacleful of meetings with the Supreme Leader, AMD and I repeatedly interrupted his attempts to mate with a particularly well-appointed female. I wonder if . . ."

RAH adjusted the interocitor. The writhing recorded images and repetitive cries of "Oh, baby, yes!" emanating from it dissolved to a live view from the Oval Office.

"We are in luck, Exalted One! We have caught them in the very act!"

For over two diors the Inspector observed the inexhaustibly energetic pas de deux performed on the floor, in a chair, atop the desk, and over the mantel. The performance climaxed for the last time with the male standing erect—supporting the equally eager female in an incredible gravity-defying clinch.

"My, I see why he's the Supweme Weader! He could teach the humans in these instructional displays some new twicks!"

AMD agreed, "Both he and the female seemed remarkably enthusiastic."

The Inspector willed the interocitor into blackness. "I've seen enough to make my wecommendations about this pwanet. I congratulate you two for your fine job pwesenting me with all the infowmation I needed about these humans. I'm very familiar with your weputations."

"Thank you, Highly Adored One."

The Inspector's eyes darkened. "Yes, I know about your work on Comedo II. The Inspector who came to judge that pwanet was gweeted by a thwong of natives chanting a song in his native language you two taught them. The lyrics said his pxteryx was so small you needed a magnascope to see it. And his matoryx wasn't confident who his patoryx was—though she could identify the top hundred suspects!"

"Our universal translator malfunctioned, Venerated One. No reproach was intended."

"Maybe. But that was no consolation for the Comedians. Before their Inspector discovered it was a misunderstanding, he'd had their whole wace neutered and sent to work as slaves in the phlegmstone quarries of Cattarhia V!"

RAH sighed, "Most regrettable. We made a small contribution to their relief fund."

The Inspector seemed unimpressed by their generosity. "And what about the species you discovered before this one, on Megakiester I?"

AM blurbled, "Yes, they were bipeds too. Very similar in morphology to humans."

"Well, I twy to be vewy understanding of pwimitive species. But I'd probably have lost my temper like their Inspector did when it came to rate them. All Galactic cultures I know of consider it insulting when a thousand beings line up facing away fwom you, dwop their lower garments—and bend over!"

"Their Inspector was a Glooteusmaximian, Vastly Renowned One. A software error in our computational system made us erroneously inform the Megakiesterians this gesture was considered the ultimate honor among its kind."

The Gorgiasian grunted. "At least those natives got to keep their pwanet. Or what was left of it after their Inspector calmed down and ordered the Annihiwator ships it called in to stop bwasting their world."

RAH clicked, "That whole affair was quite unprofitable for all concerned."

AM interjected, "What is your final judgment about *this* planet?"

"Based on their technological achievements, humans qualify for a learner's permit for interstellar twavel. They already have the industrial capability to make simple starships. Their scientists are close to discovering the

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transrelativistic equations showing how to warp the space-time continuum. If you downloaded that infowmation from your ship into their computational systems, they could build a faster-than-light drive in as wittle as 12,000 diors."

RAH fidgeted. "Do you wish us to do that?"

"That would be like giving an Annihiwator ship to a half-grown larva! Only *mature* species—those who've learned to *control* their bestial impulses—can be twusted with *that* wevel of technology. These humans are surprisingly clever toolmakers—especially considering how much of their wives they devote to copulation. But they're still just animals, with only gwimmers of intelligence. No self-wespecting sentient would cavort around naked like they do, or be as pathologically obsessed with sexual activity! It's disgusting, sacwiligeous, and unnatuwal!"

The Gorgiasian telekinetically rustled the voluminous folds of diaphanous ebony clothing surrounding hir self-levitating sluglike body—forever hidden in perpetual modesty from all other beings since the one and only time s'he had, or ever would, mate with hirself. Only hir six tiny jewel-like eyes and the tip of hir blue proboscis peeked out from that all-encompassing covering. In deference to the Inspector, RAH and AMD were also dressed in hir traditional garb. Except for the two Callicleans' rustling eyestalks, their entire bodies were enveloped by formless black shrouds.

The Inspector continued, "I'll issue the 'Eviction Notice' immediately, and have a fleet of twansport ships take their entire wace to several undeveloped pwanets towards the Core. Pleasant places, with environments ideal for their metabolism. Warm oceans of liquid water to swim in. Comfortable temperatures year-round. Pwants and twees that bear delicious, nutritional fwuits without any need to work. There the humans will be fwee to womp and fwowic in their natural naked state, and devote their whole wives to mating. Nothing to worry about, no challenges to tax their wimited bwains—or force them to think about anything but pleasure. The only technology needed in that paradise will be medbots to keep them healthy, and ensure they live their full natural wife span."

AMD said, "As you told their Supreme Leader, that will surely make their greatest hopes and dreams come true. But what if they perversely resist going to these wonderful nature sanctuaries? After all, they are only animals, with no sense of gratitude. They might damage themselves or their world resisting the transport ship robots!"

"They'll be handled vewy gently, without harming them—or your new property. When I return to my own ship shortly, I'll have their atmosphere saturated with a specially-engineered virus to induce pwolonged dormancy. When they awaken, they'll already be at their new homes."

RAH clicked, "That is reassuring, Supremely Good One. Currently Earth is a reasonably well-developed world, with prebuilt, though unhygienic cities. The humans have wastefully depleted the planet's natural resources. But we can advertise it as a 'fixer-upper'. A 'handybeing's special'."

AMD chirped, "I will place a listing in the classified section of the Central Galactic Computational System immediately. We can have an open house as soon as the planet is evacuated."

"Yes. Unfortunately, the profit we made selling Comedo II when it was vacated was not as great as we hoped. Megakiester I was never officially abandoned and so available for sale, since several natives survived the Annihilator ships. I am confident, however, we can sell this world within 600 diors—and our commission will be sufficient to purchase a new hyperdrive for our

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craft. Being marooned here since our current drive fused when we entered this system has not been pleasant. It has required much time, effort, and imagination to deal with the problem. But I believe our troubles are now over."

The Planet Inspector flapped hir robe approvingly. "It seems this has been beneficial for all concerned. Some young sentient singlet or newly-bonded couple, twio, or quartet will buy this planet as their new home, where they can fission, make nests, hang fwom twees, or lay eggs in the ocean—and start a family. You two get your hyperdrive. And the humans get what they want most—a place where they have nothing to do but eat, dwink, and mate anytime they wish!"

RAH and AMD, interstellar real estate agents, wiped moisture from their eyes. The latter said, "Indeed, Omniscient One, we feel proud to have helped do so much good. And, based on our review of humankind's classic literature, your use of a microorganism to help determine who will inhabit their planet is particularly fitting."

RAH added, "Yes. As one human dramatist might have said, 'All's well that ends Wells'." ■

IN TIMES TO COME

Our lead novella for September marks the return to our pages, after far too long an absence, of Lloyd Biggle, Jr., well known for his novels and stories of the Council of Supreme, the Galactic Synthesis, the Cultural Survey, and the Interplanetary Relations Bureau. "The King Who Wasn't" shows us an IRB agent trying to study a planet's culture from within, who suddenly finds himself a little *too* within—and trying to figure out just what it is that he's been drawn into. Just how a civilization works can be far from obvious, and looking very closely is not necessarily the best way to see the whole picture!

A while back, there was a flurry of excitement about the announcement of several experiments demonstrating "faster-than-light" light pulses: was the old science-fictional dream of faster-than-light travel was on the verge of becoming reality? As John G. Cramer pointed out in one of his "Alternate View" columns, the reality is considerably less dramatic than that. But those experiments may still have impressive practical applications, not in commuting, but in computing—a possibility Dr. Casimer DeCusatis explores in his science fact article on "superluminal computers."

Our September issue also features the conclusion of Ben Bova's *The Precipice*, Jeffery D. Kooistra's first *story* here in too long, and new stories by Brian Plante and Christopher McKitterick.

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Illustration by Vincent DiFate

The old saying about not judging a man until you've walked in his shoes applies even in space.

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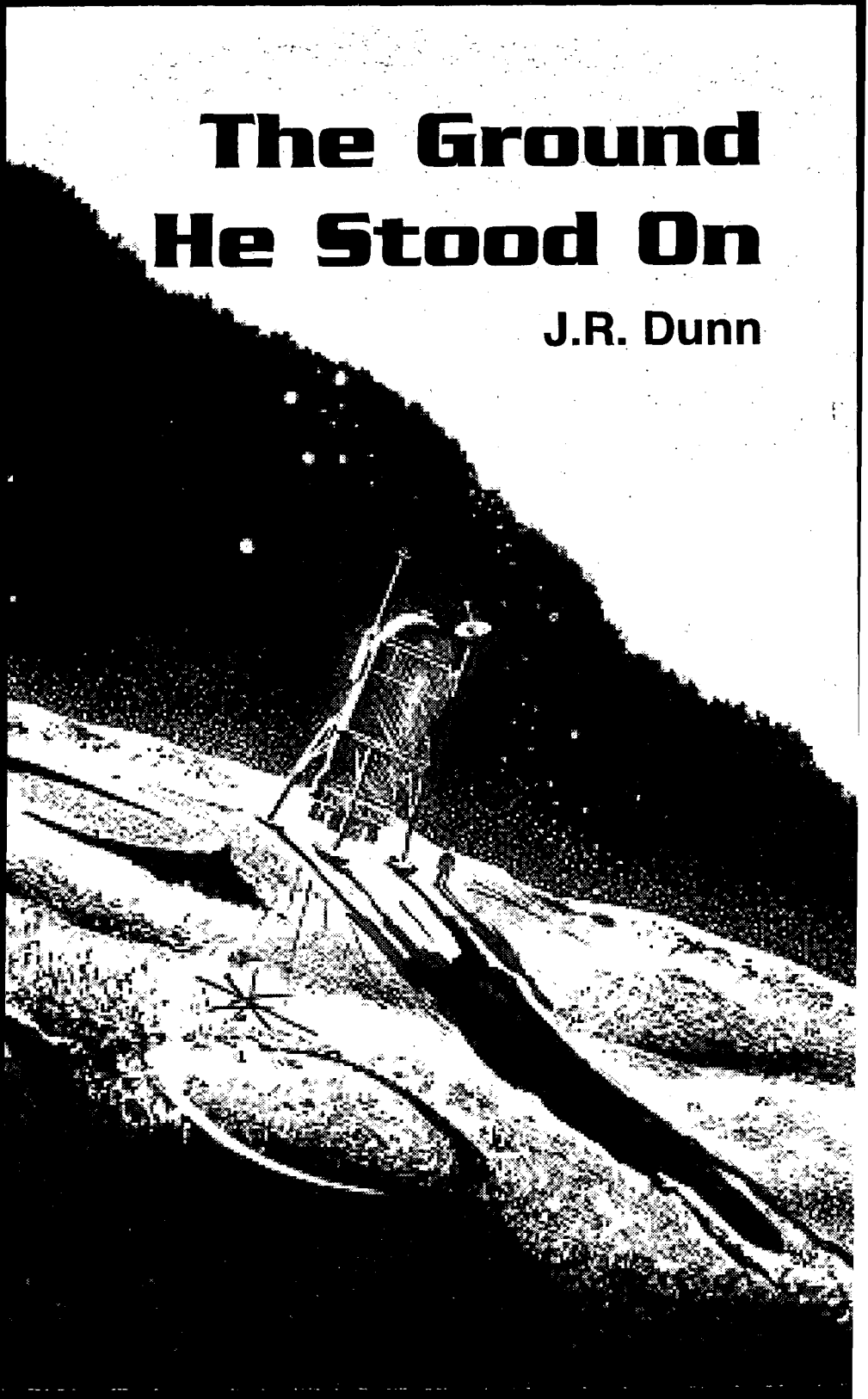
The Ground He Stood On

J.R. Dunn



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It was the dust that alerted him. A thin veil at the bare edge of vision, nearly overwhelmed by the earth-crosser's brightness. At first, eyes fixed on the pod's board with no more than an occasional glance to spare for the rock, he dismissed it as illusion, a mirage generated by the absence of visual cues for weeks on end. When the smokelike trail became too obvious to ignore, Witte's mind set to work generating explanations: *a patch of volatiles boiling over . . . a meteor strike . . . something like that, sure. What else could it be?*

Then the rock spun a little further, revealing the ship. Witte eyed it in puzzlement, for a moment convinced it was derelict hardware—the open framework and large antenna did remind him of the massive old planetary probes of the last century. But not quite enough.

Witte was a careful man. Before getting on the horn, he checked the board thoroughly, assuring himself that approach was nominal all around. Mike in hand, he studied the asteroid as he waited out the quarter-minute delay. The rock's rotation had carried the ship, if that was the proper word, from profile to three-quarters view. The source of the dust lay some distance beyond it, just over the curve of the rock. Witte caught his own image in the window, the splash of color in his hair barely vibrant enough for people to call him 'Red', at least until it became clear that nicknames were frowned upon among NASA's management-track personnel. Only a few times over the past month, late in the day when he was tired, had he regretted being sent out alone on this mission. He was making up for it now.

"There's a *what?* " Operations demanded. "Stand Blue, that is highly un . . . hold on, Luray's coming over."

The speaker rattled then emitted the growl of the Station operations chief. "A vehicle, Blue? Let's have an ID. It's not GEAC or Europe. They know we're tagging that rock. And it can't be anybody else. So . . . talk to me, Blue."

Witte tilted his head. It looked as if the dust source was coming into view. "It's definitely a vehicle. Doesn't resemble anything I've ever seen before. . . ." He caught his breath at a hint of movement within the dust cloud. "There's . . . there is . . ."

He exhaled loudly. "There's an individual in a spacesuit visible on 2007 Poussaint A's surface. It's a man . . . That is, a human being. Not . . . y'know, something else. . . ."

Much as he knew it was coming, he still flinched at the delayed burst of laughter from the speakers. "Of course it's a human being," Luray said. Someone whistled the *X-Files* theme in the background. "'Something else . . .' OK, Blue—who is this, anyway? Stand Blue, that's . . . Huh. Dave Witte. OK, Witte. Find out who he is, where he came from, and what the hell he thinks he's doing out there. Inform me *personally*. Ops out."

"Roger, Station," Witte said. He put away the mike, pressing until he felt the *click*, eyes not leaving the port before him. The figure on 2007 PA stood at a sharp angle to Witte, patiently watching the pod approach. He held some kind of tool in one hand. Behind him the dust was beginning to clear.

A thrust alarm blared at Witte, and for the next minute his attention was riveted to the board as the pod decelerated. Only when the system signaled 'rendezvous complete' did he again look up. The figure had vanished.

With a shake of his head Witte started going through the postflight checklist.

Some time passed before Witte set out for the rock. He had to oversee while the pod matched 2007 PA's rotation, then complete a suit check. Life was full of pitfalls, and Witte's experience had shown him that most of these were avoidable. Or rather, his experience at second hand through his old man, who had never in his life double-checked *any-*

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thing and often, along with his wife and kids, paid the full price. His dad had died last year, in an accident that Witte truly did not require the details of. He hadn't had time to visit the grave yet. When he did, he was afraid the epitaph would read 'I Tried.'

Luray contacted him twice. Witte reminded him that he was a man alone handling a two-man mission. "Hey, don't blame the leave schedule on me," Luray told him.

He set down a few yards from the ship. He'd chosen to match rotation directly above it more because it represented a landmark than any other reason. A scrape at the regolith with the toe of his boot sent him bounding back up again. It could have been the Moon if there had been any gravity to speak of and it was a shade or two darker.

He approached the ship, not too close for fear of the pilot getting touchy. The thing was a jumble of mismatched components, some of which Witte recognized, though most he did not. A simple open framework bearing an engine, an antenna, a cockpit and four large, half-deflated plastic fuel tanks. As for the life-support mod . . . Well, the quarters of Witte's pod, an orbital-transfer vehicle modified for distance work, might be a little tight, but this looked like something out of Poe. He noticed a word written on the side and bent to read it but the light wasn't right. It looked as if it began with an 'R'.

A static line stretched from the vessel into the billowing dust. Witte made his way over to it, taking his time—the eva unit around his waist was massy enough to be troublesome. He gave the line a yank as he reached it. It held nicely.

The figure in the suit was emerging from the plume even as Witte came over the horizon. He paused a dozen steps away. His suit, which looked to be standard issue, was coated with a thin layer of dust. The visor, as always, revealed nothing. He raised a gloved three fingers to show what freak he was using. Witte switched over to it.

"Uhh . . . hiya."

A grunt served as an answer.

"My name's Witte. Dave Witte . . . I wasn't expecting anybody out here. I mean . . ." He raised his arms. The motion threw him off balance and he grabbed for the line. "Eight million miles is a long hike, right . . . ?"

The man said nothing. "Uhh . . . what's your name?"

A glove touched the nameplate on the front of his suit.

"You've . . . got some dust on that, yeah . . . Keenan, huh? Well, Keenan, what brings you out here?"

For the first time, Keenan spoke. "You're from REO, right?"

"That's right. Resources Exploitation Office, here to put down a beacon and establish a claim, way we do."

"Well, Reo, I'm claiming this rock."

"You're claiming 2007 PA," Witte said with an air of inevitability. He'd assumed it had to be something of the sort. After all, there were only so many reasons a man would travel millions of miles of vacuum to an empty, lifeless earthcrosser.

"This rock," Keenan repeated, striking the surface with the tool in his hand, a combination axe-and-shovel designed for use in microgravity. The gesture didn't shift his stance an inch, so secure was his grip.

"I see." There didn't seem to be much else to say.

Flourishing the shovel in the direction of Witte's pod, Keenan said, "Now, Reo, I assume they want a report."

"They're waiting, yeah."

"Then why don't you go talk to them?"

Witte saw no point in dragging matters out. "OK." He released the line and began drifting. "Oh by the way, where'd you get the go-cart?"

A stab of the tool halted Keenan in the midst of his turn. "I built it."

"Pretty good job."

"It got me here."

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"What's it called?"

For the first time, Keenan seemed to hesitate. "Reneé."

"I know what he's doing."

Witte had taken his time calling back. First he had to make sure he didn't track any dust aboard the pod. He hadn't cared for the way Keenan had looked covered with the stuff. Didn't he realize how much trouble that could cause?

"Took me ten seconds to figure it out," Luray went on. "What else could it be?"

"Looks like he's got us," Witte said. "He was here first." The World Court decision was clear: mining of triple-A asteroids was no different in essence from the terrestrial variety. Prior practice indicated a straightforward legal resolution: a claim had to be made on the spot, by a "human person" duly authorized by one of the spacefaring governments or coalitions. Claims filed upon detection, as the Union had been doing, possessed no legal standing. Following the decision, the US, EU, and GEAC decided to cooperate anyway, by informing each other as to which rocks they wanted, a sensible arrangement that might have been tried earlier had the Europeans not been so damned greedy. There was no lack of prospects, with 180,000 earthcrossers identified so far. But it was still necessary to make the claim (particularly in light of the fact that some of the smaller nations, not to mention the odd private corporation, were getting antsy). The missions were milk runs, reserved for new kids. Witte had been on two before this one.

"He does *not* have us. No way. The paperwork on that rock is *in*. Now what's his name . . ."

"Keenan," Witte spoke over the questions. "No first name. Obviously a rigger—he's experienced. His own vessel. Built it himself, he says . . ."

"Keenan," Luray muttered to somebody nearby. "Give me everything we got . . . Now, Witte—there's a staff lawyer on the line. Vincent Tommaso. Vinnie, you there? Right. He'll tell you how to handle it . . ."

"How you doing, Witte?" The voice was quick, the words east-coast sharp. "Uhh . . . anybody there . . .?"

"There's a time-lag, Vinnie."

"A what? Whattaya . . . Oh . . . Got you. OK, Witte. Now this SOB Keenan is holding us up. What he wants is a percentage. We're supposed to buy his worthless ass off . . ."

"He *does* have a claim in," Luray murmured.

". . . know what he's gonna get? He's gonna get dick. Not a thin dime. 'Cause if we give in to him, we'll have to deal with every other trapeze-artist up there. We're not setting any precedent with this asshole. So we are gonna burn Keenan. Got me? Witte? Hello . . ."

Witte let out a weary sigh.

"Right, right . . . I got carried away. OK, Witte, here's what we're gonna do . . ."

Witte was surprised to see Keenan no longer working the same site. Instead, a dust plume now rose from a spot about ten yards on. Passing the first site, he saw that Keenan had left behind a narrow but pretty deep hole.

He paused before setting down. 2007 PA was a typical carbonaceous chondrite asteroid. A 300 by 150 meter dump—the other term was landfill—a melange of various elements that had been beating its way around the solar system for longer than Earth had existed. Repeated collisions and near-misses had shattered it time after time over the eons, with the debris falling together once again in new and thoroughly mixed configurations. Like the majority of asteroids, it was no longer an integral object, but a mess held together by gravity, chemistry, and old times.

He landed five yards short of the plume. "Keenan?"

A moment passed before Keenan emerged, dusty as ever. His visor confronted Witte wordlessly.

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"Your friends call you Frank or what?"

"I got no friends on this rock, Reo."

"Hmph. I suppose it wouldn't do any good to invite you to the pod." Tommaso had suggested Witte make the offer, to get Keenan away from his own ground and put him off balance.

Keenan twirled the shovel by its strap. "So what they say, Reo?"

"Well . . ." Witte paused to put his thoughts in order. Tommaso's first argument had involved Keenan's status as a NASA employee. He'd been less than pleased to learn that Keenan had quit before setting out. "This rock was discovered by a NASA affiliate, and was inspected by both radar and laser before you—"

"Maybe you ought to read *NASA v. ESA*, Reo. It's clearly stated that detection doesn't mean a damn thing. It's no better than looking at it."

"OK, I got you." Witte had expected no less. Tommaso might have handled things differently, but he was the lawyer. His attempts to contact Keenan through that big antenna had failed. Keenan had sent out several messages himself, though, all in PGP, all to unknown recipients. "But let me tell you this: they'll file anyway. It may be invalid, but they'll keep you tied up in court for years, and—"

"No way. They've got no claim, and they'll never get one." Keenan lunged forward, gripping the shovel tightly. "The system will spit it out soon as they try to file. I checked, Reo."

Witte raised his arms. "Look, Keenan—"

"And the courts? The courts will tell 'em to take a hike. They will throw it out, with prejudice, and my costs paid. They are sick and tired of scam space resource cases. Especially in Europe, where I filed—"

"OK, Keenan. I hear you fine. I'm just the messenger, all right? I didn't ask for this."

Lowering the shovel, Keenan made an indecipherable sound.

"So what are the holes for, anyway?"

"They're for minding my business in."

Witte shook his head, as much as he could wearing the helmet, anyway. It was next to impossible to get through to this guy, wasn't it? "You're prospecting, huh? I wouldn't know what to look for. How much you think it's worth?"

"Thirty-forty mil."

"Thirty . . . is that *all?*" The value of orbital resources had dropped since the first rocks were brought in, much as the three giants tried to keep the prices up. 2012 JA1 had paid out hundreds of billions. This one ought to bring in a couple hundred million at least.

"Part I'm interested in. Which reminds me . . ." Keenan moved back toward the hole barely visible though the dissipating dust.

"I'm supposed to drop my beacon anyway, but that'd be stupid, right?"

"You always answer your own questions?"

"Fine, Keenan. You need anything?"

"If I do, I'll ask."

"Don't be shy."

"And don't you be a pest, Reo."

Witte seldom had trouble sleeping in microgravity the way some people did. But tonight he floated in his harness, eyes wide, muscles rigid. A combination of exhilaration, tension, and annoyance, he supposed.

He'd sent an e-mail to his mother after he ate. She was resigned—frighteningly so—to the fact that something would happen to him out here, on the grounds that the apple never fell far from the tree. He was going to screw up, same as his father had, and that would be it. He kept in touch to reassure her, though he hadn't been very diligent about it this mission. He'd tried to amuse her by mentioning the lone weirdo on the rock. Keenan would not have appreciated the way he'd been libelled, a portrayal combining equal aspects of Fred C. Dobbs, the Flying Dutchman, and Rumpelstiltskin.

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You had to give him credit. You'd never catch Witte pulling a trick like that—building his own vessel out of spare parts and then zipping off into the deep black with his thumb out in the nonexistent wind. Witte wasn't the explorer type. He was more of a consolidator, a man of the second wave, patiently and efficiently pulling together what the forerunners had pioneered.

It scared him to think about that craft of Keenan's—he could imagine what the instrumentation was like. What bothered him most was the lack of shielding. This pod didn't have much, but Reneé was one bare-nekkid little girl where that was concerned. Wasn't he afraid of orbital cee? It would be another year and a half before Witte could be certain he wasn't one of the small percentage susceptible. Keenan hadn't even been up that long. Schweickart's syndrome was no joke. Overall spontaneous metastasis—tumors triggered by background radiation breaking out in different organs simultaneously. Made you shiver just to think about it.

He envied the fact that Keenan could name his ship. NASA didn't go for that, afraid that somebody would come up with something offensive. Instead they named each mission separately out of a random collection of innocuous terms. Witte had spent some pleasant time on the way out considering what he'd call the pod if he'd owned it. He hadn't come up with much. He wondered who Reneé was. A girlfriend, probably. Most riggers weren't married. A wild crew: take in their hundred K, blow it in six months on the Riviera or in Cuba, and catch the next shuttle up to refill the old wallet. Keenan fit the mold. You'd think that Luray, at least, would understand that. He'd been herding them for years. He ought to know how willful riggers were.

He was about to drop off when the question of Keenan's life-support system rose once again, in terms of how many ways his own could go wrong. One thought led to another, and at last, wide-awake, he got up to run a complete diagnostic.

No dust was visible today. No sign of Keenan either. Witte paused a few yards from the ship. Not a lot of places you could hide out here.

This morning's conversation with Tommaso had been the ordeal he'd expected. ". . . it would have worked if Admiral Kirk had the least bit of backbone. You hear me, Witte? I'm referring to you. I know what you did. You brought it up. You conversed. You let him talk. Well, *skipper*, you don't *converse*. You don't let him say a fuckin' word. You *tell him*. You lay down the law. But you . . . . Y'know, Luray, a guy flies a goddamn spaceship out into the great beyond oughta be able to just look at somebody and cut 'em to pieces. I don't know. Where you gettin' your astronauts, anyway?"

"He's got a point, Witte. This rock isn't that important in and of itself . . ."

"Then why don't you just give it to him?" Witte muttered.

". . . and this Keenan's certainly nobody special. One more jackass rigger. But . . . What was that, Witte?"

"Nothing. Can we move on?"

"We got grounds," Tommaso said unprompted. "We got plenty of grounds. But it's the presentation, see. You know what I'm saying, Witte? *Witte* . . .? Jeeze, this time thing. We gotta do something about that . . ."

He spotted a movement in Reneé's shadow.

"You back, Reo?"

"Why don't you tell me to hit the road if it's your rock?"

Keenan moved into sight. "No. Because if I start telling you now, it'll get played out. And when I *really* tell you, when you *have* to get . . . you won't."

The terminator crept toward them across the surface. Witte went over to the ship. "You know, the more I see of

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this bird, the more I like it? It's got economy. One thing bugs me, though. The screening. Lack of it, rather."

Keenan was tying down a number of containers so they stayed put. "Doesn't bother me."

"No? Scares the hell out of me."

The Sun chose that moment to vanish over the limb of the rock. If there was any answer from Keenan, Witte didn't hear it. "What about Reneé? What she think?"

Keenan stood up. Witte could make out the bare outline of his features by the glow of his HUD. He looked pretty haggard, but so would anybody after a month in transit. "Let's leave her out of it. Go to today's entertainment."

"I'm supposed to confiscate your ship."

Keenan surprised him by laughing out loud. Dim as it was, Witte could clearly see him rocking back and forth. He never lost his hold, though. You couldn't beat a rigger for that.

"You got me, Reo," Keenan said at last. "I didn't think of that one."

Witte remained silent, feeling a mingled sense of amusement and exasperation.

"What for?" Keenan went on.

"Using NASA materials—"

"Uh-uh-uh, stand fast, my man." Witte could clearly see Keenan shaking a finger at him. Earth-Moon was rising over his shoulder, casting a diffuse glow over the scene. "It's all surplus, Witte. I got the receipts. I bought it, I put it together, I launched it."

"There's something about the hangar, too. Using it without authorization. 'Theft of services', they call—"

"I didn't use their damned hangar. I used the UN facilities. Rented a corner from 'em. That's right. They barely use it themselves. What else?"

Witte didn't answer, transfixed by a sudden vision of himself as a traffic cop. *Hey, you got a taillight out, y'know that, buddy?*

"I'll tell you what else," Keenan said. "Unauthorized launch. That's it, right? Show me where that applies to somebody in orbit. It doesn't. It's all launches from dirt. Believe it or not, Reo, there's a flight plan filed at Ops. Probably never even accessed. Tell Perry Luray to download it."

Witte let out a sigh. Keenan sounded pretty sure of himself. Easily understood—if Witte had flown eight million miles in a pup tent he'd be confident too. All the same, the obsessive impulse that had driven him out into the cold dark alone in a vessel that looked as if it was held together with duct tape also blinded him to the actual nature of his opposition. It wasn't merely Dave Witte, or Luray, or the lawyer either. It was NASA, a bureaucratic monster, a vast segment of the third-millennial megastate, foremost of the beasts of the earth for pride, that had swallowed the infowave, swallowed cislunar space, was preparing, in its good time, to swallow the inner system as well, and would not put any effort into straining out a gnat like Francis Keenan, unless Keenan had an ace in his pocket bigger than any ever flashed before. Witte wondered how he could make this clear to him. He wondered if it mattered.

"Tell me something, Reo. What was supposed to happen? You confiscate Reneé and what? Leave me here?"

"I didn't listen close . . . but the impression I got is that you're supposed to beg me for a ride home . . ." He tried to twirl one hand, another problematic gesture while wearing a suit. "That'd prove you lacked actual capability to make a claim. I don't know. All legal spam . . ."

"Who's the lawyer?"

"Guy named Tommaso."

"He a prick?

"He's a lawyer."

"Aye-aye."

Witte smiled. There had been a short-lived fad a while back for using antique nautical terms on the job. Belay that, abaft of this, ahoy the other. Short-lived due to the fact that management had

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clamped down in favor of the tried-and-true nominal mission status jargon of the past sixty-odd years. They'd instituted a system of fines, graduated for each offense, monitoring the teams both on and off duty. A shame, and an overreaction in Witte's opinion. He'd kind of liked it.

A sudden inspiration struck him. "You know what? You could sell your story to the nets—"

"Not for enough." Keenan finished tying down the crates and straightened up, letting out a slightly mournful grunt. Witte eyed him, a dark shape etched by the light of the stars.

"Only trying to help, Keenan. I mean . . ." Witte went silent. He'd gotten himself into a position where he was trying to say something he didn't quite know how to put into words. Not a novel experience for him, though it used to happen more often than it did these days. He wanted Keenan to be aware that, meddlesome SOB though Dave Witte might be, there were some types of SOB he was not—in particular, whatever classification best fit that pair back home, who were very shortly, he was utterly sure, going to tell him to threaten this tired, lonesome figure. "Not too many people have been farther out than we are now. And . . . well, Keenan, I'm not against you."

Keenan laughed. "Sure you are." He sounded positively cheerful.

"OK. Have it your way."

"Well, you ain't *with* me, Reo."

Abruptly the Sun returned, with no warning and far too quickly for Witte's visor to polarize. "Whoo!" he cried, raising both hands.

"Always gets you," Keenan chuckled. "Every damn time."

"We need more photos of the *USS Titanic*."

"I sent photos."

". . . why? 'Cause when he gets back, we are gonna have an EMS team waiting, and we are gonna grab the silly bastard and run him straight into a padded cell. Arrange a sanity hearing at a venue of our choice, display shots of the thing he was tooling around in, and have him put away. Any action taken by him will be wiped— Well, you just better send some more goddamned pictures, Witte. Y'know, the real beauty of this is that it doesn't rely in any part on the personality flaws of Lou Skywalker here."

"I dunno, Vinnie." Luray sounded . . . perhaps not discouraged, but far from the robust, assured despot familiar to Witte. "He had two days of psych tests before we hired him. And it doesn't help us here and now."

"Well, whattaya want, Perry? Nothing helps us here and now. Those tampered files don't help us here and now. We are constrained to work with what we got, and what we got is Witte—"

"Enough, Vinnie."

"—send out a boy do a man's—"

"Enough, I said." Luray's voice had regained some of its accustomed snap. "Let me talk to Witte. I'll get in touch with you later."

Witte lifted his mike. "Uhh . . . you want me to ask him about those files?" Some of Keenan's employment files had been illegally accessed and rewritten, his med files in particular. A felony, though they couldn't prove who was responsible.

"—lemme handle it," Tommaso was saying. "I'll motivate the—"

"Later, Vinnie."

There was an abrupt silence, then the sound of an indrawn breath. "OK, Dave . . . and no; forget about the files. I want you to listen.

"Yesterday, you suggested to me that we give that rock to Keenan. I think you'd better take some time to consider exactly who you work for, and why you get paid, and which side you're on. But not a lot of time, Dave. Because when you're finished with that, I want you to think of what would happen if a maniac like Keenan managed to bring it off. We've got a good system here. A system that works. We're moving into space the

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only way it is possible to do so—in a rational, structured fashion. But now . . . Keenan is all anybody is talking about in this facility. Every damnfool rigger and engineer and webster here is walking around with stars in his eyes. I built this station, Dave. I do not intend to stand by while it degenerates into a goddamned circus. You understand me?

"Now what you are going to do, is evase to that rock, and disable that vehicle. Not obviously, but permanently. He spends most of his time in his holes, am I correct? So no problem. Then you'll have some company for the trip home. But before you allow his carcass inside, he is to sign a statement that I will send you. And before you leave, you find his beacon, and you destroy it. And after that Keenan will be a joke, and things will be on track once again, and Dave Witte will have his career back.

"No—don't answer me, Dave. Your actions will be answer enough. Out."

Keenan was not down one of his holes today. He was squatting beside the last of them, several dozen yards from where his ship stood. Witte paused before landing for a quick scan of the asteroid. It was growing familiar to him; no longer a chunk of the unknown but an actual place, one that he knew.

"What's it this time?" Keenan didn't bother to look up. Witte couldn't quite make out what he was doing. One of the crates was in the way, in the midst of a clock-slow drop to the surface. A few wires dangled from the top. "They get better and better."

"Oh, yeah."

"Be a sad thing when they have to quit. I'm starting to look forward to it. My day's not complete unless I've been threatened by . . . what's his name, Tommasi?"

Witte sighed. "They won't quit, Keenan. Don't kid yourself. You've stirred up the hive. They've got you in their sights now. Their resources are infinite and they won't give up. They'll keep turning things over until they find something. Like—how come your med records have been messed with?"

Keenan straightened up. "What is it?" he said in a soft voice.

Once, in his late teens, Witte had stumbled right into the aftermath of one of his old man's disasters. Some opportunity, or job, or scheme had failed, like the previous dozen opportunities, jobs, and schemes. He got only a glimpse of his dad's face before his mom waved him away from the kitchen door. A thin bitter smile, his eyes bleak, as if he was fully resigned to the fact that his role in life was to be the butt of a joke that would never be explained to him. Witte had sworn to himself that night that no one would ever see him looking like that.

He took in the dark, mottled surface, so unlike anything back home, the greater darkness beyond the slash of the horizon, the Sun too bright for vision. For the first time he saw clearly what had pushed him out here, what engine had forced him on where so many others had failed. And seeing it clearly, he accepted the lesson of that night long ago: that the pitfalls are wide, and deep, and they come one after the other, and it is given to no man to slip past them all.

He turned back to Keenan, glad that he couldn't see through the helmet visor. "They want me to disable your ship."

Keenan regarded him for the better part of a minute. "The bastards."

"Yeah."

A glove pointed at Witte. "And here you are." Keenan laughed. "What you say your name was again, Reo?"

Before he could answer, a series of frantic beeps sounded over Witte's earphones.

"You got a ship emergency, Reo?"

Witte counted the beeps. "No, it's a message." An urgent one. What could that be about? Had Luray changed his mind? Somehow he doubted it. "Look, I gotta get back."

Keenan hesitated, as if he had more to

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say, then waved him off. His visor followed Witte as he rose from the surface. The crate, a standard characterless gray plastic, had completed its fall.

"Stand Blue returning hail . . . uh, call. Come in . . ." The station frequency was a welter of voices. He recognized Tommaso amidst all the rest.

". . . gets back here, we are gonna put him in a *straitjacket*, we are gonna shoot him with every psycho drug they make, and we are gonna *lock him up* . . ."

"Who is that shouting?" an unfamiliar voice said.

"Hold on, Stand Blue . . ."

"I'm telling you, Luray, we have *got* his worthless ass . . ."

"Who is speaking? Perry, what is going on?

"Vinnie . . . Vinnie! Off the line . . . everybody else, clear this frequency . . . Not you, Witte . . . Sorry, Director. A bit of confusion here . . ."

"Go ahead, Perry."

"Witte . . . we've just learned that our little pal brought along several hundred pounds of explosives . . ."

Witte shot a glance out the window. Keenan was nowhere in sight. He thought of the nondescript crate, the dangling wires. A smile grew as it all came together.

". . . some chemist over in the European compound. Got the raw materials from another rock. Several hundred is the minimum. It may be more. You tell him from me that he will be arrested the minute he sets foot . . ."

"Forget about that, Perry. Mr. Witte—get away from there."

"Do what the director says, Witte."

"Will do," Witte said. "Stand Blue, out." He switched frequencies. "Ahoy, Keenan."

For a moment he thought he'd have to go out and knock on Reneé's door, but then Keenan answered. "Yeah, Reo."

"Is it time for me to get?"

Keenan chuckled. "I planned on a little rest first, but why not?"

Activating the board, Witte loaded the escape trajectory he'd carefully worked out the other day. "How far do you think?"

"Oh, couple miles. Won't be a big bang."

"How'd you handle the math?"

"Buddy of mine back at the Station—" A low rumble drowned out his words. Leaving a cloud of dust behind, Reneé lifted off. "—access to the GEAC supercomputer."

"Uh-huh . . ." Witte hit ignition. He had to work to keep the pod oriented toward the rock. After five seconds the engine shut down. "Tell me when, Keenan."

"Any time."

"Go ahead."

Six distinct points on the rock gouted dust. They were visible for a moment only before their expansion blocked any view of the asteroid. Witte kept watching, counting the seconds until a dark mass emerged from the haze. "About a third, Keenan?"

"Little less. As for the rest . . . you can have it. I knew they wouldn't back off. I knew it all along. So I'm giving them what they want. Not as much platinum or rare earths as my piece, but some nice chunks of olivine and plenty of volatiles. Take it or leave it, Reo."

"I'll take it."

"You tell Luray from me—this is no longer in situ, no longer unrefined, no longer a natural object. I have marked it, I have proofed it, I have worked it, and it is mine."

"Sounds good, Keenan. Give Reneé a kiss for me."

"I'll do that, Reo."

"See you back at the Big Rock."

"Reneé, out."

"Fair winds," Witte murmured, and began plotting a rendezvous with the larger remnant of 2007 PA. He took his time about informing Luray.

He didn't come across Keenan until a week after he got back. Even with a head

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start of a hundred thousand miles, Witte beat him in. When Keenan at last arrived, Witte went to the UN hangar only to find it mobbed. Too many of the crowd were net people, and he'd had his fill of them. He'd stopped watching newscasts. Half the interviews made him look like the villain, the other half the fool.

Keenan had neither been picked up nor otherwise molested. He'd sold the story to three different continental newsnets, each having an option for lawsuit coverage that included providing him with a legal team. NASA decided to get out while it was ahead. Besides, Luray already had his scapegoat.

Witte had to look twice when he passed him in the corridor. Appearances did differ in microgravity. Keenan squinted when he heard his name, not recognizing Witte either. When awareness dawned he seemed first surprised and then uncomfortable.

"Glad you made it," Witte told him. They'd spoken only a couple times on the way home. "Any offers on the rock?"

"Yeah. Nothing I can talk about though." He looked terrible; if anything, worse than he had out there. Eyes pouched, skin ashen, a thin sheen of sweat visible on his face. He shivered a couple times while speaking, as if with cold.

"Hey Keen . . ."

Another man was approaching, more heavyset than you usually found in space. Witte had seen him around.

"How you feeling?" he asked Keenan.

"Still moving."

"You look real good. Say, you get a chance, stop over the hangar, see what we did. Carries four guys now."

"In comfort?"

"Well—"

"I may have some work for you, but . . ." Keenan checked his watch. "Right now I got an appointment."

"Don't let me hold you."

Keenan turned to Witte. "Look . . . I'm sorry about the job."

Witte shrugged. He'd been suspended as soon he came in, pending 'investigation of his role.' He knew what that meant. They were effectively holding him until things died down, whereupon they'd cut him loose. "That's OK," he told Keenan. He'd about had it anyway, after Luray's revelation of exactly what it took to reach the top.

Keenan regarded him a moment. "You know, I almost said, 'take it and be damned.'"

"Well, you didn't."

Keenan bobbed his head. "Thanks, Reo."

As he started off, Witte turned to the heavyset rigger. "You one of the guys bought Reneé? Not taking partners, are you?"

"Nah, but you know, everybody's building one. Just check around. They'll like you. You been out there. Matter of fact, why don't you stop by the UN hangar, take a look?"

"Think about shielding. There was a minor flare only yesterday."

"I got you. Not that Keen was worried. Not with the cee. Yeah, that's right. You didn't know? Diagnosed six months ago. That's why he went for the rock. Money for his wife and kids . . ."

Reneé . . . Witte looked after Keenan. He had almost reached the end of the corridor. Too far for him to call, even without the catch in his throat.

He knew, as nobody better, that there were pitfalls in this life. That they waited constantly, ever ready to swallow you up. That you walked among them without even knowing it. But for the first time he recognized that there were unsought peaks as well, peaks that you climbed without conscious awareness, all unknowing until at last you reached the top and a vast new landscape, a landscape of grace and calm, lay spread out all before you.

The man who had led him there disappeared around the corner. Witte turned away.

"Thanks. I'll be around." ⊠

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We hesitate to present this as fiction, since it really happened exactly like this. . . .

The Gelatin Conspiracy

Laurel Winter

When the doorbell rang, Medford didn't peek out the window or call the police—either would have been wise, though who'd have guessed? He just opened the door.

A man with a heavy crop of stubble on his chin and a flare gun in his hand forced his way into Medford's living room and shut the door behind himself. "Where is she?" he demanded, looking around wildly, as if he expected to see someone hiding under the aging plaid couch cushions.

Medford backed up. "I don't know what you mean—" he began.

The gunman, if you could call him that, waved a newspaper clipping. "Don't give me any of that now, buster," he said. "Don't be playing dumb with me. I know you've got my wife."

Medford recognized the clipping: his most recent humor column from the *Pine Valley Herald Tribune*, a piece about dishes you were likely to find at a Lutheran church potluck supper. He was no Dave Barry, although he harbored secret ambitions in that direction, but no one had ever physically threatened him because of his writing. "Huh?"

"My Connie's secret recipe," the man said, shoving the column in Medford's face. One of items was circled: *Mini-meatballs in Lime Jell-O.* "I know you've talked to her." He aimed the flare gun, his hand shaking.

Medford was astounded. "Your wife makes mini-meatballs in lime Jell-O?" he said.

"Well," he said, dropping heavily into the easy chair, still pointing the flare gun in Medford's general direction, "she uses orange gelatin—store brand, because you really can't tell the difference and why spend the extra money? Or at least she used to. Before she vanished."

It didn't take long for Medford—being a trained journalist and nosy Minnesotan of Norwegian descent—to get the story of how Bill Swenson's wife Connie had disappeared from the parking lot of Spring Island Lutheran after helping clean up the kitchen after the Syttendemai supper.

"How do you know she disappeared from the parking lot?" Medford asked.

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"Maybe it was somewhere else along the route from church to home. Or maybe she stayed in the church and left later."

Bill shook his head. "No, because Ruth Hanson shut the lights off and left just a few seconds after Connie; her watch stopped working just then, so we know the exact time. And Arlene Jensen was loading her coffee maker—they always need extra coffee for Syttendemai—into her car and she would have seen if Connie walked out of the lot. No, her car was there and she wasn't in the church." Bill Swenson's jaw trembled and he took a sip of the coffee Medford had made for them. The flare gun lay on the kitchen table, still pointed toward Medford.

"And you saw my column in the *Herald Tribune* and thought I had had some sort of contact with your wife."

Bill Swenson nodded.

"Did you stop and think I might have just come across one of her dishes at a potluck? I didn't, but I could have."

He shook his head. "Nope. Your picture is in the paper and I'd never seen you at our church. And Connie always makes everyone promise not to make her special dishes without her permission. Kind of like a patent."

A patent? On meatballs in store-brand gelatin? How often would you need to enforce it? Medford considered carefully before saying, "No offense, now, but I never thought anyone would ever really put meatballs in any sort of gelatin. It was supposed to be funny."

"Well, Connie was always real creative with gelatin," Bill said. "You know how you mostly find sweet stuff in gelatin, like marshmallows or fruit, or sometimes things like celery or carrots or olives?"

"Olives?" Medford asked, making a mental note for a future column.

"Well, Connie would put them together. She made up a fine recipe for that lemon gelatin with those little smoky wieners and mandarin oranges. I get hungry just thinking about it." His voice broke. "And now she's gone."

Syttendemai. May seventeenth. Now it was July second, so Connie Swenson had been missing for exactly a month-and-a-half. "I am really sorry," Medford said. "I wish I knew where she was. But I just don't."

Apparently, Bill believed him. He adjusted the flare gun so it was pointing at the dishwasher instead of Medford's chest. "I was just hoping, you know," he said. "I wouldn't really have hurt you."

On purpose, Medford added silently. He could think of few things more dangerous than a bereaved Norwegian with a flare gun. "It's all right," he said. "I'm sure in your place I'd have done the same thing."

After they finished off the coffee, Bill Swenson apologized again, took his flare gun, and left. He'd written his phone number on a sticky note and Medford promised to contact him at once if he heard anything.

Medford was trying to swim in a factory filled with partially congealed lime gelatin. Or maybe it was orange. These little meatballs kept getting in his way. And then one of them winked at him with beady eyes and they started converging on him. Meatballs with eyes! And mouths! The gelatin hardened then, and he was stuck in dog paddle position, surrounded by meatballs that didn't seem to have any problem moving through the quivering gelatin. They ate their way to him, making little tunnels. Medford tried to emulate them, but he had always hated orange gelatin and his mouth to body ratio was much smaller than theirs. The meatballs were getting closer. Now he could see they had needle-sharp teeth, like piranhas. . . .

He woke up.

The meaning of the dream was clear: his subconscious had put together three very important, seemingly-unconnected pieces of information. One: Connie Swenson's disappearance. Two: That theft at the meat-packing plant over

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Memorial Day weekend; only the ground beef had been taken, in spite of the fact that there were whole freezerfuls of sirloin and t-bone. Three: The other theft—in early June—of eggs, rolled oats and Sure-Best gelatin from two different grocery stores.

Medford hadn't paid much attention to this last one when it happened, as he'd been traumatized as a child with one too many jiggling marshmallow carrot concoctions; his mother had been culinarily allied with the vanished Mrs. Swenson. He had noted the ground beef theft, as he'd done a column warning people to look out for a fifty-foot, guerilla meatloaf. Now, with the added knowledge of Connie Swenson's disappearance and her meatball gelatin, things were beginning to make sense.

Beginning to. Medford was reasonably sure there was some sort of meatball/gelatin conspiracy, and that Connie Swenson's recipe was at the heart of it. The big question was who was behind it? And—more important—could they get Connie Swenson back?

First thing the next morning, he called Bill Swenson and laid out what he'd figured out so far.

"Well, it makes a lot of sense," Bill said. "A whole heck of a lot of sense. Except who would want that much of Connie's special recipe?" He lowered his voice. "I mean, I hate to admit this, but there was always a fair amount of mini-meatballs in lime gelatin left over when Connie took it to a potluck. Not that I minded," he added loyally. "It's even better the second day. By the fourth though—"

"The Fourth!" exclaimed Medford.

"Yeah, by the fourth day, the meatballs sort of sink down and—"

"No," Medford interrupted. "The Fourth of July. Tomorrow. Is your church having a potluck? What time?"

"We sure are," Bill said woefully. "Two p.m. But it won't be the same without Connie's—"

"We have no time to lose," said Medford. "I have to call the paper. It's late to get an ad in, but . . ." he allowed a bit of smugness to show in his voice, "I have connections."

"Huh?"

"You have to buy all the hamburger and orange Jell-O you can afford," he ordered. "Better get lime as well. And eggs and rolled oats. Meet me at my house as soon as you've got it."

Later, sweating even though he had the air conditioning turned up to maximum, Medford wiped his brow. It was hard work making an institution-sized batch of mini-meatballs in orange and lime Jell-O. Also, he realized he had made a mistake. He should have found out where the Swenson's lived and arranged to meet Bill there. Then it would have been *their* kitchen decorated with grease spatters from the hundreds, maybe thousands of meatballs they had cooked up. *Their* kitchen dripping with sticky, rubbery smears.

Still, surveying the handiwork, Medford had to feel proud. The first meatballs had been ugly, misshapen things, cooked until they were dry all the way through. There was a steady progression though—not fast, but steady—and the last batch or two of meatballs would not have been out of place in the kitchen of any potluck professional.

The gelatin was another story. Privately, Medford thought they should have used Jell-O™ brand gelatin. Maybe it wouldn't have worked out any better. They probably hadn't stirred it enough. Or the water wasn't hot enough. Or they'd gotten mixed up on how much hot water to cold water—it was confusing with all those little boxes and white paper packets. It didn't help that Medford had accidentally mixed the orange in with the lime, rather than keeping them in two separate containers. The resulting color was a rather sickly army green, although the taste was nice. Who would have thought that the meatballs

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would be the easier part?

It probably didn't matter, though. The important part of Medford's plan was the ad. If this was going to work, it seemed as though all they really had to do was to attract—well, whoever it was who had taken Connie and the massive quantities of ingredients for her special recipe. The end result didn't have to be as tasty or attractive as Connie Swenson's.

"We'd better put in the meatballs," said Bill.

Medford nodded. "Let's start with the good ones," he said. "Then if we run out of gelatin before we run out of meatballs, we can just throw these away."

"Good idea." Bill began to toss meatballs in the nearest container of gelatin. They sank to the bottom. "I don't know if I'm doing this right."

"Let me try," said Medford. He carefully and slowly placed each meatball in the pan next to him. They sank to the bottom.

"Dang it," Bill said.

"Well, it doesn't matter, does it?" said Medford. "This way it will be kind of like that fruit on the bottom of the yogurt." And, he thought, it would be easier to eat just the gelatin and skip the meatballs, if one was so inclined. He personally planned on skipping both.

What they discovered, in the process of adding meatballs to all the containers, was that, as the gelatin set up in the air-conditioned atmosphere of the kitchen, the meatballs were suspended. As they continued with the assembly process, the meatballs stayed closer and closer to the top of the gelatin.

They also discovered that somehow they'd made exactly the right amount of everything. Unfortunately, since they'd started with the good meatballs, those were now submerged in the gelatin depths, while the crummy, misshapen meatballs—the prototypes—floated, half-exposed, in the last couple containers.

There was nothing to be done about it. They completely filled Medford's fridge with Connie's special recipe.

Normally, Medford wasn't much of a cook, preferring meals at Old Country Buffet, so there hadn't been much in the refrigerator. His stuff fit in the little shelves on the door: milk, fake lemon juice (when had he bought that?), Cheez Whiz, baby dills and instant pizza sauce.

"Say," said Bill, "are you hungry?"

"Depends on what for," Medford replied. "I sure don't want to eat anything that's orange or green."

"Or round," agreed Bill.

They went to Old Country Buffet for supper, avoiding the salad bar and the Swedish meatballs. "Do you think it will work?" Bill asked over dessert, apple crisp with soft ice cream on top. "Do you think we'll get Connie back?"

Medford shrugged. "We've done what we can, Bill. Now it's up to them."

The Fourth of July. Humid. Eighty-seven in the shade. Guaranteed to melt the hardiest congealed dish. Medford didn't care. Soon his journalist instincts would be confirmed or disproved. He crossed his fingers.

They were among the first to arrive at the potluck and he only felt mildly guilty about covering an entire, strategically-located table with meatballs in gelatin. "Maybe you want to keep some of that in coolers," a lean woman in hot pink shorts and a yellow t-shirt suggested. "I've got a cooler you could use." She picked up one of the last-assembled pans.

Medford took it away from her and put it back. "No, that's OK," he said. Bill was just standing there, looking anguished.

"Really, it would be fine. I wouldn't mind." She picked up another pan.

Medford said, "Please! Leave the gelatin alone."

She set it down with a *we'll see about this!* look. He was going to have to try a different tack. "May I talk to you for a

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moment?" He took her elbow and walked her to a table with a mixed assortment of Norwegian taco salad and fruit salads with and without marshmallows.

"You know Bill Swenson."

She nodded. "Of course I do. Poor Connie. But who are you? You look familiar but—"

Darn. What if she remembered his picture from the column? Not that many people from Spring Island read the *Pine Valley Herald Tribune*, but she could be one of them. "I'm Bill's—doctor."

"Ah," she said. Her expression changed from suspicious to inquisitive.

Darn again. Now she thought he was a shrink. Well, he might as well run with it. "We're trying to help Bill get through this trauma by doing some of the things Connie would have done, like bringing her special recipe to the potluck."

"Well, I am sure Connie would have put some of it in coolers," she said.

Back to that again. "Listen," he said, "Please tell the others not to disturb us. Bill needs this time. It's essential to his recovery."

The woman backed off. "Well, if you're sure it's best."

Of course, he was not sure of anything, but he did his best to look as if he were. "Thank you for your understanding."

He went back to Bill, who was standing near the table, scanning the growing crowd. "I don't see Connie yet."

Medford checked his watch. "Well, it's not even two yet. And remember: we don't know that this will work. It's a long shot."

"But you think it might work?"

"Sure," said Medford. He surreptitiously crossed his fingers, and slapped Bill on the back. "It just might work."

Two o'clock came and went. No sign of Connie. The pink and yellow woman hovered around their table, sometimes carrying a cooler. Medford ignored her.

Two forty-five. Still nothing. No one was eating their contribution, although one elderly gentleman almost dished himself some gelatin from one of the first pans; he must have thought it was purely gelatin because he dropped the spoon when a meatball was revealed and went to a safer table.

Two fifty-seven. Pink and yellow stalked up to them with a newspaper. The *Pine Valley Herald Tribune*. "So, 'Dr.' Medford," she said. "What is this? Some sort of publicity stunt?"

"It's nothing like that, Dorothy," Bill protested.

"You keep out of this, Bill Swenson," she snapped. "I don't know what Connie would say about the way you're mocking her memory."

"Look," said Medford. "We're not mocking. You've got to trust me—"

"Sure," she said. "'Dr.' Medford. Oh, I really trust you after you masqueraded as Bill's psychiatrist."

"Hey," said Bill.

"I didn't say—" Medford began.

"You deny you're here on false pretenses?"

"Well," said Medford, "Not exactly, but—"

She cut him off with a look. "You guys can just take your meatball Jell-O and go."

"But—" Bill started.

"Go!" A formidable-looking group of women lined up behind her.

Medford and Bill each picked up a pan of gelatin. "It's not what you think," Medford said, as he started walking toward the parking lot.

He didn't get far. A short man in a wide-brimmed hat and a trench-coat stepped in front of him. "Mini-meatballs in orange gelatin?" he asked.

Astonished, Medford nodded.

"Please give it to us."

Medford stepped back. "Did you take Connie Swenson?"

"Please give us the mini-meatballs in orange gelatin," the man repeated, his voice thin and tinny.

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"Guard the table, Bill," Medford ordered. He clutched his pan of gelatin protectively. "We want Connie Swenson back, and we want her now. Return Connie Swenson and you can have this and what's on that table over there."

"I must consult with my superiors." He spoke into his ring finger in a strange language.

Medford looked closely at Mr. Trenchcoat's hand. Five fingers, all right—or rather, four and an opposable thumb—but all the fingers were the same length and had at least one joint too many. And why was he wearing a trench coat in this heat?

The pieces came together in Medford's brain: Connie Swenson had been abducted by aliens who had some sort of bizarre protein and sugar need best met by her special recipe. They had been behind the packing plant and grocery store robberies as well. And now they were here.

There was nothing between him and the alien, but the concoction it was willing to commit kidnapping and robbery for. Medford took another step back. "Give us Connie Swenson," he said again, proud that his voice didn't wobble like the gelatin he was holding.

"That is not possible," said the alien. "Connie Swenson is integral to our survival in this part of the galaxy. Would you be interested in trading technology for mini-meatballs in orange gelatin? We have a nice fital drive, barely-used."

"No!" It was Bill Swenson's voice. "I want my Connie back." He held a pan high in the air. "Let her go! Or I'll dump this on the ground and step in it."

It was hard to tell, with the hat and coat, but Medford thought the alien went pale. Even if it did, what would that mean anyway; maybe this type of alien went pale when it was joyful or nonchalant. Its next words sounded anxious, though. "No. Do not harm the mini-meatballs in orange Jell-O. We need it for the next stage of—never mind, it is not translatable. We are in need of it."

"I want to see Connie; see that she's all right."

The alien seemed to hesitate and Bill raised the pan higher. "I'm not kidding. I'll drop it."

The alien spoke to its finger again and Connie Swenson's image bloomed in the air. She was almost nude, wearing nothing but her underwear, sweating profusely, and she seemed to be cooking. The edge of the image stopped before it showed her task, but Medford was willing to bet she was making her special recipe.

"Connie," said Bill, his voice breaking. "Oh my gosh, Connie. You're alive."

Connie paid no attention to him. Just kept mixing whatever it was she was mixing. "It's like a TV picture of her, I bet," Medford said. "Hang in there, Bill. We'll get her back."

"Listen," he said to the alien. "You want this meatball gelatin stuff we made, right?"

"You are correct."

"So it's not like you need to have it made specifically on your ship or wherever you have Connie right now. Are you familiar with our concept of 'takeout'?"

The alien started talking to its finger again.

Medford didn't know what it was saying so he pressed on. "You could get someone to make big batches of this for you in the convenience of their own kitchen and then you could just pick it up. And you could pay with 'fital drives' or whatever that was you said."

A bunch of aliens dressed in various outerwear—parkas, trench-coats, even mink!—suddenly appeared in front of Medford. Oh my gosh, he thought. This is it.

Then Connie Swenson pushed her way out of the aliens, seemingly unaware she was in her underwear. She and Bill ran to each other. Pink and yellow hustled up a table cloth to wrap around Connie.

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"We are here for our 'take-out' order," said a new alien, one wearing a blaze orange jacket and blue snow pants. Medford handed over his pan of mini-meatballs in orange and lime gelatin and nodded toward the table.

The aliens filed over and took the pans reverently. "Hey," said Medford, realizing he likely wouldn't see any of his pans again. Not that he'd used them much before, but it was the principle of the thing. "Maybe you should give me a deposit."

Blaze orange spoke to its finger and a large, metal *something* appeared on the ground in front of Medford. "A slightly-used fital drive," it said.

Another alien, this one in black leather, came up to Blaze orange with the pan of gelatin that had been scooped by the elderly man. Blaze orange bent over it, muttering in its language. It pulled a piece of gelatin off and ate it.

Medford winced. This probably resembled Connie's secret recipe in much the same way that the QE2 and a canoe were both boat rides.

Blaze orange took a second bite. "Who made this?"

Medford raised his hand. Bill was too busy hugging Connie to take any credit.

"We would like you to fulfill all future 'take-out' orders. Where is your 'kitchen'?"

Medford gave the aliens his address. "You know," he said, trying to think of the bigger picture, "I do more than make mini-meatballs in orange and lime gelatin. I'm a journalist. Could I interview you for my paper?"

He found out all sorts of things about them, like the fact that they found most parts of Earth—even Minnesota in the summer—very cold. It wasn't until close to the end of the interview that Medford realized exactly how big this day was. "Tell me about the 'fital drive'" he said. "What does it do? How do I use it?"

Blaze orange looked uncomfortable. "I'm sorry," it said. "That is the term in your language. Perhaps I've pronounced it wrong. Could it be fetal? Or fotal. Or fatal?"

"I don't understand," said Medford.

"It is because there are no 'vowels' in the word," said the alien. "Our linguistic understanding of 'English' requires 'vowels' for pronunciation."

Then it hit Medford. "Do you mean 'FTL'?" he asked. "Faster-than-light?"

"Yes," said Blaze orange, brightening. "You are familiar with it? Good."

"I've heard of it," Medford said weakly. "So how does it work?"

The readers of the *Pine Valley Herald Tribune* were lost by the explanation, as was Medford, as were 99 percent of the rest of the world's population. But he wrote it all down, along with the tidbits most ordinary people found more interesting: the aliens liked complementary colors and they were frightened by the high-pitched humming of mosquitoes although they'd never been bit and they were all hermaphrodites who found humans bizarre.

By the time the interview was printed and reprinted a zillion times—not to mention the royalties from the FTL drive—Medford was rich enough to remodel his kitchen and put two extra refrigerators in the garage to hold *his* special recipe for the aliens. And he figured he was probably more famous than Dave Barry. ■

CORRECTION

We accidentally gave inconsistent dates for
L. Sprague de Camp in his obituary in our April 2001 issue.
His dates are November 27, 1907, to November 6, 2000.
We sincerely apologize for the error.

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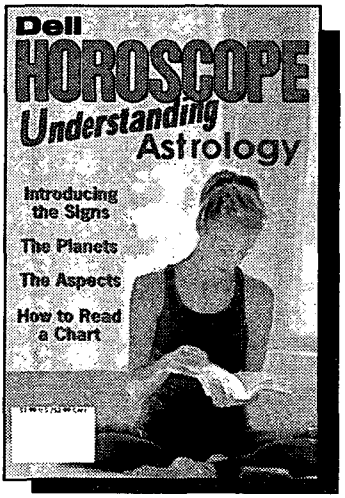

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2001: THEN AND NOW

Stanley Kubrick's 1968 motion picture *2001: A Space Odyssey* depicted a world in which our country had an operating moonbase and a huge rotating space station. We had solved the problem of building artificially intelligent machines. We were mounting nuclear-powered manned missions to the planets.

The reality of the year 2001 is upon us, and we notice that it is very different from the movie. There is no moonbase, no Pan Am rocket spaceliners, no Hilton Hotels in orbit, no manned missions to the planets, no cold-sleep hibernation, no intelligent computers. Perhaps it's time to ask how Arthur C. Clarke and Stanley Kubrick could have been so wrong in their predictions, or perhaps to ask where we took the wrong path between 1968 and 2001.

The film *2001* was a work of genius and deep ambiguity. The film works at many levels. At the literal level, we watch as man-apes are "uplifted" by alien intervention, converted from vegetarian losers on the edge of extinction to neocarnivores, inventing weapons and warfare as we watch, and beginning the trajectory that will give them control of the planet and propel them into space and beyond. We watch near-contemporary humans on the verge of the next uplift step. There are also allusions to Homer's *The Odyssey* and to philosopher Friedrich Nietzsche's focus on the next stage of human evolution, the coming of the *übermensch*.

The cinematic imagery of *2001* is also memorable. As a physicist, I often witness myself and my colleagues confronting a new theoretical concept or a new experimental result, struggling to make sense of it. As I watch, I recall Kubrick's man-apes, crouched before the black monolith, tentatively reaching out to touch it, then jumping back; reaching out again and again, a bit more secure each time.

Perhaps because I'm a physicist who writes SF, last December as the year 2001 was about to begin, I was contacted by newspaper and TV journalists and interviewed about the differences between *2001* the film, and the reality. This experience led me to some thoughts on this question, which I want to share with you. Since this had its inception in interviews, I'll use that format.

Q: Why is the present manned space program so different from the one that Clarke and Kubrick envisioned?

Some of you may recall that after the Apollo 15 landing on the Moon in 1969, there was an amazingly abrupt decrease in public enthusiasm for manned space flight. I have a theory about what happened.

I believe that a principal sociological force driving the manned space program of the 1960s was *territoriality*, the basic human urge to explore and occupy new territory. I think the man-in-the-street expected the Apollo astronauts to go to the Moon and claim it as our territory. Neil Armstrong was supposed to step out of the Lunar Lander and say "I claim this territory in the name of the United States of

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Illustration by Wolf Read

America."

When instead, all he said was the scripted line about a "giant step for mankind," the aftermath was like air escaping from a balloon. The entire space program deflated very rapidly when the taxpayers discovered that the Moon Race was not about claiming the Moon as a territory of the United States of America. The pattern of exploration and territorial expansion we had learned in history class had not occurred. Moreover, in 1969 the Vietnam War was in full swing, diverting money and attention away from the space program.

Kubrick's movie was written and filmed well before the Apollo 15 landing. In *2001*, there was not only an international space station, but there was a US-owned base on the Moon. That moonbase was clearly a part of our claim of the Moon as territory. In the movie, our politicians had not shied away from claiming the Moon. We were actively competing with the Soviets for our part of the lunar landscape, keeping them away when we did not want them to land, etc.

The movie differs from present reality because the policy makers of the Nixon Administration decided to sidestep the territorial issue. In this way, they maintained more control over a space program that they had inherited from a previous administration and for which they has little enthusiasm. (Note that my protagonists in *Twistor* do claim the territory.)

Q: How does the space station in *2001* compare with the one NASA is building?

I think NASA's whole space station concept is flawed. Contrary to the impression you might have received from the public-relations boys, a space station is not a good science base and is not needed for a stepping-stone to space. It doesn't take much more energy to go all the way to the Moon than it does to go to the space station. It's merely an expensive

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detour, designed to keep NASA's standing army of engineers and bureaucrats fully employed.

In the early 1990s when Congress was considering the funding of the space station, all of the scientific and engineering professional societies opposed it as having minimal scientific value. It was clear to the science professionals that one can do better science in space using an unmanned platform that doesn't have astronauts clunking around on it.

Clarke and Kubrick showed more insight than NASA in this respect. In *2001* the space station is an airportlike place of hotels, restaurants, phone booths, customs officials, and short-term visitors. The real science in *2001* is being done at the moon base, and this has led to an unexpected discovery, the monolith.

Q: Why doesn't NASA's space station rotate to make artificial gravity?

It's primarily a matter of size and cost. A toroidal space station with a small radius and a high spin rate would have very large Coriolis force effects, as discussed in my column on artificial gravity (*Analog*, Feb. 1987). The astronauts inside would experience severe disorientation every time they turned or nodded their heads. To avoid such problems, a space station that rotates for artificial gravity must be large, with a minimum diameter of 100 meters or so. NASA is keeping the cost down by not building a space station that large, and is keeping things simple by not using spin gravity.

If you really wanted to build a Kubrick/Clarke-style rotating space station at a low cost, the scheme suggested by the Lawrence Livermore Lab some years ago might be the way to go. They suggested an inflatable space station that could be collapsed, boosted to orbit, and then pressurized with air. A torus would be a natural shape for such a structure, which after inflation could be spun to produce artificial gravity. Then the construction crew could simply climb inside and do whatever additional construction was necessary in the Earth-normal gravity and shirtsleeve environment inside.

Q: What could put us back on a track toward the space accomplishment of *2001*?

I think that we should immediately cease building any kind of space station. Instead, we should be building a moon base, so that we can occupy it and begin to learn how to live, work, and do scientific research off the planet. I find it uncomfortable to contemplate that we still have all of our eggs in this single pretty blue basket, and that our Solar System has the unfortunate habit of throwing large rocks at it.

Q: Might a different version of recent history have led to achieving anything resembling the Kubrick/Clarke vision of *2001*?

It's hard to know how things could have been different. The Vietnam War certainly diverted us off the path toward space exploration. Moreover, at its beginning NASA was put together from military bureaucrats and test pilots who had little appreciation of what science is or how it is done. The injection of a strong scientific mission at the very beginning of NASA might have set things on a better path. In a previous AV column, (*Analog*, Mid-Dec. 1987) I discussed Freeman Dyson's vision of how the Apollo Program might have been done with much more of a scientific component.

The other problem with the historical development of the U.S. space program is that everything costs too much. As long as that is the case, you will not see the kind of large-scale developments that Kubrick and Clarke envisioned. Over the years, NASA has invested almost nothing to advance propulsion technology beyond chemical rockets. One unfunded alternative, discussed in one of my columns (*Analog*, Aug. 1987), is laser-sustained propulsion. It is a technology that could replace large expensive rocket boosters and lower the payload-to-orbit price tag.

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Q: How far are we from cryo-hibernation for long-duration space travel, as used in the Jupiter Mission?

Cryo-hibernation turns out to be more difficult than Kubrick and Clarke had imagined, but it's possible that some biomedical breakthrough could make it feasible any time. However, if you think about it, the cryo-hibernation technology was probably more useful to Kubrick in making the plot work and keeping the character-count down than it was for the actual Jupiter Mission. It would have been easy enough to do the mission with a fully-populated ship, but that would have been distracting to the movie audience.

Q: How far are we from a reasoning computer like the HAL 9000?

Artificial intelligence also turns out to be a much harder problem than Kubrick and Clarke imagined. We have expert systems that can make educated guesses and neural networks that can learn through "training". These show some rough similarities to truly intelligent systems, but they are very far from true reasoning.

I have a speculation about this. Nature is very good at taking something that works and making it bigger, e.g. the giraffe's neck and the elephant's trunk. Why then, when so many animals have brains, did it take so long to evolve an animal with a brain as big and smart as ours? I think what took so long to evolve was not the big brain but the mechanism that stabilized it and kept it sane. Our brains run on the hairy edge of instability, which is why there are so many humans with mental problems and why so many smart people have emotional stability problems.

Computer-based neural networks show the same symptoms. When you make them too big, they go unstable and don't work. As far as I know, computer researchers actively working on artificial intelligence have not yet mastered such stability problems. Therefore, I think HAL 9000-type systems are a long way off. And when we have them, they will probably have just the kind of stability problems that HAL had in the film.

Q: How far are we from contact with other intelligent species? Or have they already contacted us?

I think alien contact is far more unlikely than Kubrick and Clarke imagined, because there's probably on the average less than one intelligent civilization per galaxy. My columns on Fermi's Paradox (*Analog*, Jan. 1986)and on the Rare Earth Hypothesis (*Analog*, Sept. 2000) both address this point. The alien contact in my novel, *Einstein's Bridge,* avoids this problem by using intelligent aliens in an entirely separate universe, who come looking for us using wormholes. They sniff us out because we are doing high-energy physics, a sure sign of intelligence.

Q: Is our world better or worse than the one depicted in Kubrick's movie?

In many ways, today's world is better. *2001* implicitly extrapolated the Cold War politics and paranoia of the 60s to the present. Kubrick and Clarke did not foresee the end of the Cold War or the meltdown of the Soviet Union.

Today, if we lack moonbases and manned exploration of the Solar System, we have a calmer world, with little of our brainpower and wealth diverted into unproductive contests with international communism. Probably because this burden has been dropped, in the last decade our economy has blossomed with amazing productivity and innovation. I believe that soon we will be able to afford to venture out from the Earth again, first to the Moon and then to Mars. We will begin to place some of our eggs in other baskets. ■

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Grandpa?

Edward M. Lerner

The lecture hall was pleasantly warm. Behind professor Thaddeus Fitch, busily writing on the chalkboard, pencils scratched earnestly in spiral notebooks, fluorescent lights hummed, feet shuffled. A Beach Boys tune wafted in through open windows from the quad.

"And so," he continued, "travel backwards in time would violate causality, and hence appears to be impossible." He turned to face the class. "The problem is most commonly illustrated with the 'Grandfather Paradox.'

"Imagine that I had the technology with which to visit my grandfather in his youth. Once there, what is to stop me from killing him before he'd had the opportunity to reproduce? But if I did succeed, who was it who had travelled backward. . . ."

A collective gasp interrupted his lecture. As Thaddeus realized that the students were all staring at his chest, he glanced downward to see a red dot glowing on his white shirt. The professor next noticed, in the back row of the hall, a young man who seemed to be aiming some sort of pistol at him. The would-be sniper's hand seemed to shake in unison with the wobbling of the red spot.

The young man was not enrolled in the Introduction to Physics class, yet he looked somehow familiar to Thaddeus. Perhaps it was the angle at which he cocked his head, or the shock of bright red hair, or the piercing green eyes. In a rush of *presque vu*, Thaddeus recognized a version of himself.

The futuristic handgun with its (laser?) sight, the anachronistic clothes, the look of fanaticism . . . it suddenly all clicked. "My grandson, I presume."

His visitor nodded.

"It can't be done. *Something* must cause such an attempt to fail." His spine tingling despite his heartfelt conviction, Thaddeus's eyes resumed their standard lecture-hall sweep. "Class, as I was saying. . . ."

Two loud shots rang out almost as one. The noises released the students from their paralyzed shock. As they wrestled his assailant to the floor, Thaddeus realized that the first shot had been the backfire of a passing vehicle, and that the unexpected noise had startled his grandson enough to throw off his aim. A hole in the chalkboard showed that causality had needed only inches of deviation to protect itself.

A soft "pop" emerged from the pile-up of students who had tackled the time traveller. The pile collapsed, as if its central support had vanished. As confused students gradually untangled themselves, it became clear that Thaddeus' grandson had, in fact, disappeared.

Thaddeus' early afternoon lecture started little different from his morning

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session. The hall was perhaps slightly warmer; the music from the quad was now by the Everly Brothers. The fluorescent hum was occasionally submerged by the buzz of students discussing the morning's excitement.

"Imagine that I had the technology with which to visit my grandfather in his youth. Once there, what is to stop me from killing him before he'd had the opportunity to reproduce? But if I did succeed, who was it who had travelled backward. . . ."

A large pigeon chose that moment to fly through an open window into the hall. Its stately path abruptly veered downward, and it thumped, flapping feebly, to the auditorium floor. Thaddeus had just noticed what appeared to be the handle of large throwing knife when a mob of enraged students rushed the returned red-haired attacker.

Once more, the time traveller disappeared from the pile of bodies to the accompaniment of a pop.

Word of mouth had filled Thaddeus' third lecture of the day to overflowing. The crowd warmed the hall to an uncomfortable degree; expectant muttering masked any music that might have been playing on the quad.

"Imagine that I had the technology with which to visit my grandfather in his youth. Once there, what is to stop me from killing him before he'd had the opportunity to reproduce? But if I did succeed, who was it who had travelled backward. . . ."

Thaddeus' now all-too-familiar lookalike appeared in the aisle behind the last row of lecture seats. Moments later, an ovoid object came hurtling towards the professor.

Midarc, the grenade disappeared with a pop. His grandson vanished with a second pop.

Order eventually returned to the lecture hall. Students took their seats. All eyes turned questioningly to the professor.

"I believe that we've seen the last of our troublesome visitor," said Thaddeus.

He paused. He shrugged. He smiled.

"I've decided that I'll never have children." ■

EDITORIAL Stanley Schmidt

PIVOTAL EVENTS Continued from page 6

But while we're waiting to find out, we might well wonder what other events might have happened in 2000 that could yet turn to have been more significant than that election. An asteroid *really* deflected onto a collision course, but not yet noticed, would certainly qualify. So would any number of scientific discoveries that may have been made, but not yet published. Or perhaps they have been published—that happens fast nowadays, at least on the internet—but their eventual implications for how we live have not yet been recognized. Such an event might even be the birth of somebody who will eventually make such a discovery, or recognize previously unsuspected implications of somebody else's, but not until he or she grows up. Any of those things, or perhaps some other that I haven't thought of, may eventually turn out to have been a far more significant event of the year 2000.

But we won't know until much later, when the consequences have been realized. As the old adage says, only time will tell. □

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Happy Deathday

Robert Scherrer

There may not be things people were not meant to know—but there are certainly things they'd rather not know.

2021

My deathday is July 18th. I spent it this year as I have every year for the past ten: at home in bed, with my wife nearby. I can't afford a private doctor, and I've heard too many iatrogenic horror stories to check into the hospital for the day. So I just lay quietly, imagining all of the different ways it could happen. A sudden squeezing pain in my chest? Or maybe a jackhammer headache, announcing a burst blood vessel in my brain. A cold, air-conditioned breeze blew over my face, chilling the sweat on my forehead. Around sundown my legs started to tremble uncontrollably, so I pulled the covers up to my neck. Knowing the day on which I will die, but not the year, sometimes seems worse than knowing nothing at all.

When midnight rolled around, I heaved myself up onto the edge of the bed and felt my fear slowly ebbing away. I wandered out onto the front porch with my wife, and we celebrated with some cheap champagne. It was one of those sultry nights we occasionally get in Chicago in the summer, but the humid warmth felt oddly comforting. I glanced up at the stars and saw the distortion field of the Chtarri ship slip silently overhead. A dirty finger wiping the dome of the sky, smearing out the stars as it passed in front of them. The Angel of Death, erasing stars, erasing lives. I shook these morbid thoughts from my head. No need to worry for another year.

Like most data miners, I got paid strictly on contract, so I was back at my desk early the next morning, looking for work. I pulled up several prospective jobs on my screen, along with my AI's estimate of the payoff probabilities. Most of these were the usual narrow bell curves, centered on depressingly small amounts of money, but one of them was blank, with a note attached: "Bill, are you still in the data-mining business? If so, please contact me. Bob

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Field." I hadn't seen Bob since he'd joined the Chtarri Institute. Odd that he wasn't going in-house for the job. And he wanted a face-to-face. But I couldn't afford to be picky.

The Chtarri Institute huddled among the remains of a defunct particle accelerator out in the western suburbs. Long prairie grass had reclaimed most of the lab, although I could make out the circular scar of the accelerator ring on a slight plateau next to the road. The Institute occupied the central high-rise building, a curved, concrete monolith looming above the Illinois plains like a modern Stonehenge.

Bob was still in a meeting when I arrived, so his secretary shunted me into the Visitor's Center. Photos of the Chtarri ship covered the walls of the cramped room. These must have been taken by unmanned probes, but even from space the distortion field masked the faint reddish blob of the ship. Against one wall, a video about the Chtarri played in an endless loop. I caught a few fragments of the video while I studied the photos, but it was a collection of the same recycled facts that I'd heard dozens of times before: ". . . seems to be a localized, intense gravitational field, violating General Relativity . . .", ". . . following the disastrous Chinese manned expedition of 2013 . . ." In one photo, the ship resembled a cylinder pinched at the waist; in another, it looked more like a slightly deformed sphere. ". . . obviously do not experience time in the conventional way . . .", ". . . toward understanding the riddle of the Chtarri . . ." A computer reconstruction of the true shape of the Chtarri vessel, carved in Lucite, hung suspended from a wire in the center of the room. The contorted model was knotted like something out of a topologist's nightmare.

After ten minutes pondering "the riddle of the Chtarri", I was ushered into Bob's office. Bright summer sunlight flooded through a floor-to-ceiling window, illuminating a sparsely-populated bookshelf on the opposite wall. Bob grinned and sprang across the room to pump my hand.

"What have you been up to?" he asked.

"Oh, the usual freelance jobs. Lots of work, and not much money." I studied the name plate on his desk. "I see you've made it to the exalted position of 'Assistant Director for Internal Affairs'."

"Indeed I have. And I think I could get you a full-time job out here when you get tired of freelancing."

"You know I don't much like the Chtarri."

Bob shrugged. "Some people hate the Chtarri and some people worship them. I don't think either attitude is very reasonable. Let me show you something."

Bob flicked a wall switch, and I heard the familiar words : "*Chtar ri chol fung pyon luk chul . . .*" It sounded like a demented version of Korean played at 1/10 speed.

"You've heard the first part of this—we all have," Bob said, "but this recording goes on for another 13 hours and 22 minutes. That's the first thing we heard from the Chtarri ship when they took up orbit twelve years ago. Then they immediately began broadcasting the deathday information in binary, which they've continued doing, without interruption, for the past twelve years." Bob turned off the recording. "Thirteen hours of gibberish. That's the sum total of everything we know about Chtarri, and we've never been able to decipher it."

"Have you tried playing it backwards?"

"Very funny. Actually, we have. As well as every other permutation. Our linguists have spent the past decade knocking their heads against it, with nothing to show for their efforts. And the Chtarri have remained in the exact same orbit, ignoring all of our attempts to communicate."

"Not exactly friendly, are they?"

"I'm not sure that has any meaning

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when applied to the Chtarri." Bob strode back to his desk and settled into his chair. "We know less than nothing about the Chtarri. Why do they broadcast the deathday information? Hell, how do they *know* the day on which we're all going to die? And why do they send everyone's month and day of death, but not the year? Is it because they don't know the year, or are they just withholding it for some inscrutable reason? I know I'm going to die on June 22nd, but it doesn't do me much good if I don't know the year."

"But you take precautions on your deathday."

"Sure, everyone does, except for the few people who decide that they'd rather not know their deathday." Bob drummed his fingers on his desk. "Let's get down to business. You said you'd be willing to take this job on a contract basis, so here's what we're looking for. We've had three suicides at the Institute in the past three months."

"Actual, or presumed?"

"Two actual, and one presumed." He squinted at a sheet of paper on his desk. "Leonard Kosnik, Philip Chuang, and Jason Krauss. Chuang and Krauss are the actual suicides: both killed playing Russian roulette, apparently simultaneously. The third case is presumed: Kosnik was driving here to work on his deathday and was killed in a car crash. We don't allow our employees to work on their deathdays, much less encourage it. He must have been crazy to take such a risk."

I found myself nodding. "And what do you need me for?"

"Two of the three guys left notes. Not exactly suicide notes, but I need to track down what they mean. The first one was from our crash victim, Kosnik; it just says 'I am you'. The second, from Chuang, is a date his wife found on a scrap of paper in his desk drawer at home: 'November 12, 2122'."

"That's more than a hundred years from now."

"Yes, very odd. I have no idea what either of these notes means."

"And you want me to find out."

"Exactly."

"But why are you going outside of the Institute at all? You must employ hundreds of data miners."

"Slightly fewer than a hundred. The problem is that they all work in S Division, which also employed all three of the suicides. Frankly, I'm having trouble getting much cooperation from S Division. I think they're hiding something. I wanted to bring in someone from the outside, someone I could trust."

"S Division? What's that?"

"Statistical analysis." Bob fumbled under his desk and brought up a display on the wall. I squinted to make out the milky diagrams against the bright sunlight streaming through the window. Bob pointed at a blurry red dot orbiting the blue globe of the Earth. Stylized radio waves connected the ship to a set of radar dishes scattered over the globe. "The Chtarri datastream actually arrives in two separate pieces, broadcast simultaneously at slightly different frequencies. We receive a transmission for each individual shortly after birth. The higher frequency datastream contains the time and latitude-longitude of the birth, which we can correlate with the individual newborn. The lower frequency stream contains the actual deathday. Both streams are encrypted at the receiver and sent here, where we correlate them without decryption and store the information and the decryption key for the parents." He turned off the display. "But what most people don't realize is that we decrypt the deathday information separately and use it for statistical analysis."

I had heard rumors of this, but I was still surprised. I turned to stare at Bob. "You actually look at the deathdays?"

"Only in a statistical sense. We don't know which days correspond to which individuals, so there's no loss of privacy." He began tapping a pencil on his

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desk. "And we never release the raw data to the public." More tapping. "Anyway, data security around here is about as tight as anything you'll ever see. We're completely compartmentalized. We've got firewalls inside of firewalls. Hell, I don't have access to half the information that flows through here. That's why I need your help."

"But what's the point of collecting the deathday information at all?"

"We're hoping to learn something we can use. For instance, a sharp rise in winter deathdays might indicate a big flu epidemic coming. We wouldn't know the year, of course, but we could use influenza mortality as a function of age to make a rough guess. Unfortunately, nothing much has ever come of this."

Our conversation drifted into less and less relevant areas, and I was impatient to get started, so I excused myself. Bob cleared his throat. "Bill, there's one other thing you need to know. Chuang and Krauss—the guys who died playing Russian roulette—according to their friends, they didn't die on their deathdays."

"So they lied about their actual deathdays. Happens all the time."

"That's what I think. But it's a strange coincidence that both of them would have lied. Just keep this quiet. People depend on the accuracy of the deathday information to plan their lives. We don't want to start a panic."

The drive back home would take almost an hour, so I decided to hunt down a cave in the local area. I found a well-equipped one in Batavia, just outside the Institute. The operator on duty took my personal information and gave me a cursory glance. "Booth 6," he said. "You need to pay in advance if you want more than half an hour." I gave him my card; no telling how long this would take.

I sealed the booth shut and powered up the connection to the Skein. Nodes began to glow in the dark, connected by a tangled coil of multicolored curves. I was relieved to see that this cave used the standard symbology: green curves for AI-generated threads (reliable, but often useless), yellow for threads generated manually (caution! human deceit possible) and red for threads of unknown origin (danger! Why conceal the origin of a thread?).

I started to craft a node to plant in the Skein. This was the true art of a data miner: specifying the node precisely enough to get useful information, but broadly enough to attract the occasional wild-card thread that might hold the answer. I began with the easier job of parsing the date. {Time > month November}AND{Time > day 12}AND{Time > year 2122}. Pretty straightforward. The cave displayed my node as a calendar, with the date circled. Cute. Then I began work on the cryptic sentence. A spider drifted past my face weaving a green web of threads. I waved, and the spider waved back with its two forelegs. Back to the sentence. {Person > I: possible specific Kosnik OR possible generic} AND{Action > am: possible existence OR possible equivalence OR possible identity}AND{Person > you: possible generic OR possible specific Chtarri Institute employee}. The simplest English sentences were still the hardest things to code. Within seconds, spiders swarmed around both of my nodes, weaving their tangled green threads.

I traced the threads from the date first, since that seemed more promising. Bundles of threads ran straight into reference engines. Not surprising. I activated one of the engines to see what it would spit out: "November 12, 2122: 204th anniversary of the founding of the Austrian Republic." "November 12, 2122: 178th anniversary of the sinking of the Tirpitz." "November 12, 2122: 141st anniversary of the first balloon crossing of the Pacific Ocean." "November 12, 2122, 113th anniversary of the outbreak of the Golan War." The list droned on and on, an ocean of information, but

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nothing I could use.

I checked my second node. Multiple threads splayed out in all directions, but a cluster of them converged on the same node. It was shaped like a church, but a complex diagram of straight and wavy lines hovered over the top—the Church of the Feyn. I reset the node, adding a specifier AND{Organization > Church of the Feyn}. Most of the threads vanished, and I traced one to a reference engine: "I am you— one of the eight sacred sayings of the Church of the Feyn." So Kosnik was one of the Feyn Men. I didn't have much use for the various bizarre cults which had sprung up in the wake of the Chtarri incursion, but this was my only lead, so I couldn't afford to ignore it.

I love the old Eastern European neighborhoods in Chicago. The summer heat had relented a bit, so I decided to park a few blocks away and walk. A row of identical squat brick houses stretched out before me, each one nestled behind a narrow, neatly-trimmed front lawn. Tree-filtered sunlight dappled the sidewalk. A few old people sat on their front porches watching the world go by. I glimpsed some names on the mailboxes: Velius and Gimbutus and Daukantas. Probably a Lithuanian neighborhood. The Feyn headquarters was indistinguishable from any of the other houses, except for an unobtrusive Feynman diagram engraved on the door. The door opened to reveal the figure of George Labokas, a middle-aged guy in a white shirt and dark pants, starting to get bald on top and fat around the middle. Not exactly my idea of a cult leader. Labokas led me to an office at the rear of the house. "Can I offer you something to drink?" he asked.

"No thanks," I answered. "I really don't have much time."

Labokas settled into a maroon leather armchair, and motioned me toward an identical one. I glanced around the room. Aside from a few stylized Feynman diagrams on the wood-panelled walls, there was nothing to mark this room as a Feyn sanctuary. "Well, what can I do for you?" Labokas asked. "You were rather vague on the phone."

"I've come to ask about one of your members, a Mr. Leonard Kosnik."

"I'm afraid that Len was an apostate."

"A what?"

"An apostate. He left our church over a year ago."

"Len Kosnik is dead. And he left a note behind, which said, 'I am you'."

Labokas smiled. "He was obviously reaffirming his devotion to our philosophy. A pity that he died before I had a chance to talk to him. How did it happen?"

"An automobile accident. He drove to work on his deathday and was killed in a crash. We're considering it a case of presumed suicide."

"Ridiculous! Did he jump off a bridge? Did he shoot himself in the head? No, he just went for a car trip—"

"—on his deathday."

"Kosnik obviously had decided to rejoin our church. And Feyn Men do not kill themselves."

"But you guys believe in reincarnation, so suicide wouldn't be such a big deal, would it?"

"We believe in transtemporal transmigration of the soul, a very special kind of reincarnation." Labokas leaned forward and put his fingertips together. "Do you know why all of the electrons in the universe have the same mass?"

"No. I'm not a scientist."

"Richard Feynman showed that there really is only a single electron in the universe. It travels back and forth in time, manifesting itself as an electron or an anti-electron, eventually occupying the place of all of the electrons in the universe. In the same way, there is only one human soul, which travels back and forth in time, eventually animating all human beings. Just like the electron in a Feynman diagram. We're all the same person. Eventually you will get to expe-

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rience every human life which has ever existed or ever will exist."

"So if you were stuck in a bad existence, why not end it and start over? Seems pretty reasonable to me."

Labokas pursed his lips, and his speech became clipped. "There is only one human life, and we are the stewards of it. No one may take it upon himself to shorten it. I don't see how I can make myself any clearer."

I decided to change the subject. "Does the date November 12, 2122, mean anything to you?"

Labokas leaned back in his armchair. "November 12? Isn't that Veteran's Day? No wait, that's November 11. November 12 doesn't ring a bell. It certainly has no special significance in our Church."

"Well, thanks for your time. I'd better be going." I stood and tried to edge past Labokas.

"Would you like some more information on the Church of the Feyn?" Labokas planted himself between me and the door. I grudgingly accepted a few pamphlets. Having paid my "fee" for this visit, I turned to leave. Labokas extended his hand, palm upwards. "I am you."

"I very much doubt it."

I got permission from Bob to take a look at Len Kosnik's work files. I pulled up his scratchpad for the day before his death. Meaningless sentences filled the screen: "I am you." "We are you." "They are us." Kosnik seemed like a pretty disturbed guy. An audio file was attached to the scratchpad. I activated it, and it spewed out, "*Chtar ri chol fung pyon . . .*" Kosnik had the entire 13-hour transmission hidden on his machine, and it appeared that he had been trying to decipher it. Definitely not part of his job description.

I forwarded a progress report to Bob and then spent the next two weeks learning more than I ever wanted to know about the historical trivia associated with November 12th: "Venera 2 space probe launched", "Yuri Andropov succeeds Leonid Brezhnev", "Formation of the Baltic Union". I was getting nowhere, and I wanted to wrap things up by the end of August. My wife's deathday was coming up in mid-September, and I always tried to take off work the week beforehand so we could spend some time together, just in case.

My break finally came on August 10th. As usual, I stopped into the cave near my house to see if the spiders had made any further progress on my calendar. More useless green threads connected to dozens of items of historical minutiae, but I made out a single red thread, trailing away beyond my visual horizon. I traced it to a private node, a white box with no distinguishing features. It was sealed up tight. I pinged the box. A few seconds later, the box sent back a short blip: "Meet me tomorrow, 9 a.m., 63rd and Cottage Grove. Green dress."

The El rumbled overhead as I cruised down 63rd Street. The South Side was frightening even in broad daylight. I knew I wouldn't die that day, but nothing prevented my being beaten, robbed, or shot. I spotted a wispy woman in a green dress clutching a small briefcase and glancing furtively up and down the street. I swerved over and opened the door.

"Get in, quick," I said. "Have you just been lounging around out here? Do you know how dangerous this neighborhood is?"

She slid into the front seat, brushed back her stringy black hair, and glared at me. "Of course I know how dangerous it is. I just got off the El. You're five minutes late." She turned and glanced out the rear window. "I wanted to make sure nobody saw us together. Take us somewhere private where we can talk."

I pulled onto Lake Shore Drive and headed north. "Who are you?" I asked.

"I'm not going to tell you my name. I could lose my job if anyone finds out about this."

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"Don't worry, I don't have to reveal my sources. That's not part of my contract."

"I worked with Jason Krauss. He was my friend." She wiped something from her eye. "We were happy together. I know he wouldn't have killed himself."

I pulled into the parking garage at the Museum of Science and Industry. "Nobody will see us here. What do you want to tell me?"

"It was Kosnik's fault. He persuaded Jason and that other guy . . ."

"Chuang?"

"Yes, Chuang. Kosnik convinced them to take part in some kind of crazy experiment. And Jason ended up dead." She began to cry softly. "Kosnik was nuts. He told me once that he had cracked the Chtarri message."

"Did Krauss believe him?"

"I don't know." She pulled a sheaf of papers from her briefcase and fanned them out on the dashboard. "Kosnik and Jason were both obsessed with this, but they never told me why. These are graphs of the total deathdays for everyone born in the last eight years. Here's the first one, for children born in 2013. Those kids are all eight years old now. The first point is the number of kids who will die on January 1st, the second point gives the number who will die on January 2nd, all the way through to December 31st." The graph was just a flat line with the expected small bumps and wiggles. White noise. The woman pulled up the second sheet. "Now look at this one. It's for kids born a year later, in 2014. See anything strange?" In the second graph, a small bump rose above the straight line.

"That looks like a rise in deathdays for a particular day."

"That 'particular day' happens to be November 12th, the day you're interested in. Now look at the third one." She proceeded to show me all eight graphs, and the bump got larger in each, until in the final graph, it was a sharp spike towering over all of the other dates. "Look at this," she said. "Almost 1/50 of the children born last year are destined to die on November 12th. It should be only 1/365."

"But what does that mean?"

"I have no idea. But it really bothered Jason. He made these copies for me and told me to hold onto them in case anything happened to him." She sobbed. "You can keep them; I don't want anything more to do with this." She shoved open the car door.

"Wait, I have some more questions."

"I told you everything I know. Figure it out yourself. That's what you're getting paid for." She slammed the door and ran away into the bowels of the garage.

Why were increasing numbers of children destined to die on November 12th? I entered the deathday data into my computer by hand, and then wandered into the kitchen to get some coffee and think. Something nagged at the back of my mind. What was it that Bob had said about flu epidemics? I jumped up, spilling some of my coffee on the kitchen table, and ran back to my office.

I called up some standard mortality tables. Suddenly I felt a cold chill creep up my spine. I ran a cross-correlation, with an extrapolation of current lifespan trends. The answer popped onto my screen, stark and implacable: a death sentence for us all. And in my cold terror, I understood what Kosnik and Chuang and Krauss had done.

Bob dropped my final report onto his desk; it landed with a dull thud. "I don't get it," he said. "You claim that the number of newborns with a November 12th deathday has been increasing every year. What does that mean? And what does it have to do with November 12, 2122?"

I paused for a few seconds to collect my thoughts. "It turns out that November 12, 2122 will be a very special day in human history." I leaned back in my chair. "It's the end of the world."

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Bob smiled. "Come on, Bill, stop kidding around."

"I'm completely serious. I don't know how it'll happen. Nuclear war? Bioterrorism? Maybe even an asteroid strike. All I know is that on November 12, 2122, everyone living on the planet will die."

Bob's smile vanished. "That's just crazy. What makes you think that?"

"It's the pattern of the deathdays. Think about it. Kids born four or five years ago will be 105 or 106 when the year 2122 rolls around. Not many of them will make it that far, but a few will, and those lucky few will all die at the same time on November 12, 2122. That's what gives the small bump in the deathday graph. And what about the kids born last year? They'll only be 102 when the missiles fly or the meteor strikes. I checked the mortality tables; a child born today has almost a 2% chance of living to 102. And all of that 2% are going to die together on November 12, 2122. That's what gives the big spike in last year's deathday graph.

"I don't believe you."

"Just wait and see. The signal will get stronger every year. A child born ten years from now will only have to make it to 90 to see the end of the world. More than a quarter of the population can expect to live that long. How are you going to hide it from the general public when one-fourth of the newborns have a November 12th deathday?"

Bob stared at my report, then looked back up at me without saying a word. I stood and leaned over his desk. "It's obvious that Krauss and Chuang and Kosnik reached the same conclusions," I said.

"And that's why they committed suicide?"

I gazed past Bob out of the window, out over the prairie grass rippling in the wind. "We're all prisoners of fate, doomed to die on our deathdays. But I believe that the Chtarri message contains the key to getting out of that prison. Kosnik really did decipher the Chtarri message, and he found a way to evade the predicted deathdays. But he needed some volunteers to test his theory. So he recruited Chuang and Krauss to see if it would be possible for them to die on a day other than their deathdays. They knew what was at stake. Maybe they were willing to sacrifice their lives to prove that the end of the world could be evaded. Or more likely they didn't really believe in their guts that it would be possible to die on the wrong day. We'll never know. But their deaths show that Kosnik was right. The end predicted by the deathday data is not inevitable."

Bob shook his head. "Nonsense. Kosnik was a statistician. How could he succeed in translating the Chtarri message where all of our linguists have failed?"

"Because Kosnik figured out who the Chtarri are and where they come from. 'I am you.' 'They are us.' Kosnik wasn't planning to rejoin the Feyn Men, but their ideas gave him the answer to the central mystery of the Chtarri. They are us. Our descendents, from a thousand millennia in the future, evolved beyond recognition, evolved into creatures so alien that mutual communication is impossible. And their very existence means that the end of the world is not inevitable. We can find a way to evade our deathdays if we can crack their message."

2026

My deathday was July 18th. I spent it this year as I have every year for the past three: boating on Lake Michigan. Of course, like everyone else, I have no idea now of the day on which I will actually die.

Does this mean that the world won't end on Nov. 12th, 2122, after all? I don't know; that's a question for the scientists and philosophers. What I do know is that I will die on a random day in a random year, known only to God. And that's just fine with me. ■

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People often don't fully understand what they're up against, but they do what they can—which sometimes surprises even them.

The Walls That Bind

Jayge Carr

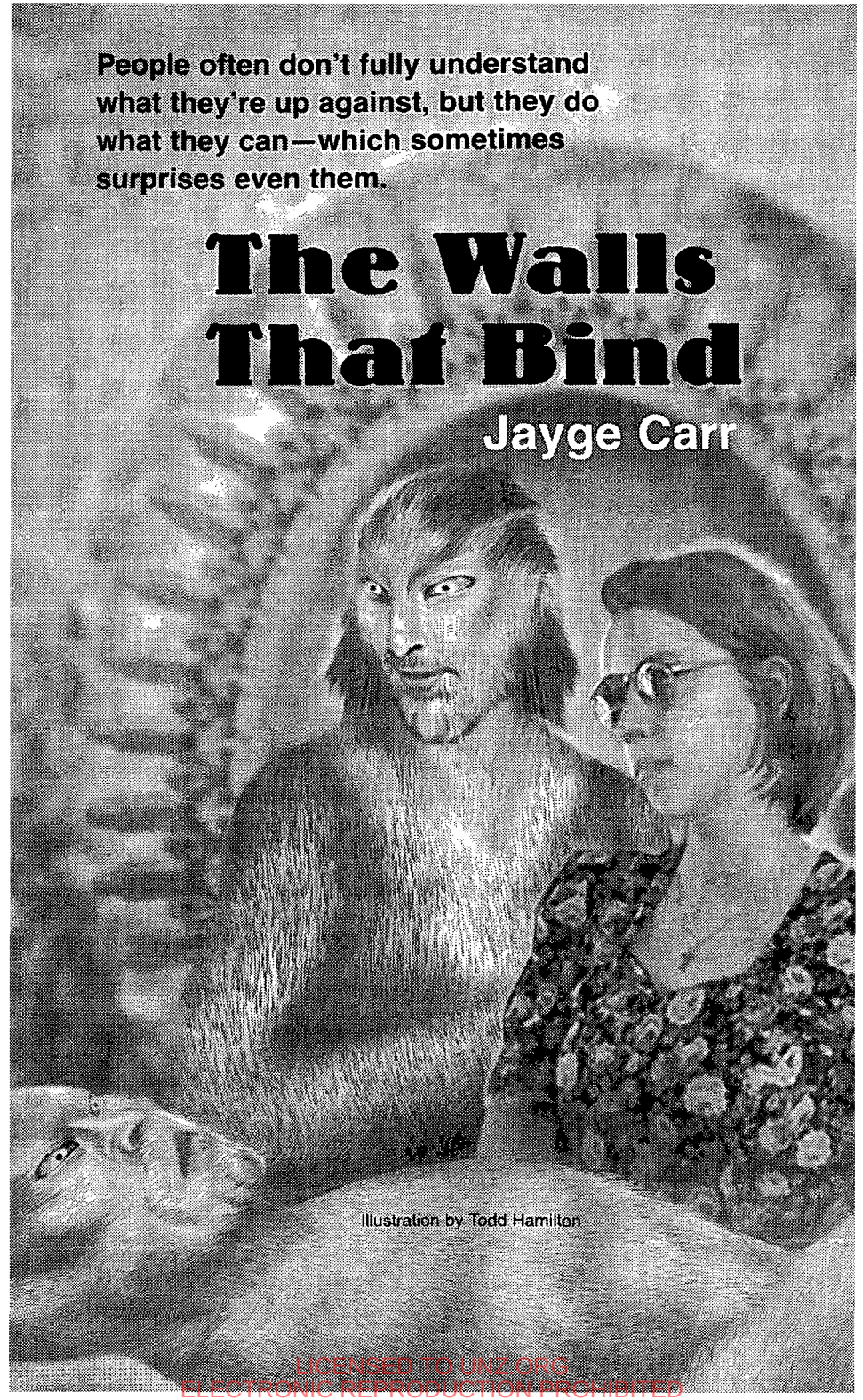

Illustration by Todd Hamilton

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For years, there had been people who claimed that mysterious aliens had abducted and then released them. Alien sightings. Mysterious disappearances. Discussions pro and con. Books. TV shows. Believers and debunkers. But no one could argue when seventeen-hundred-plus people disappeared simultaneously, between dark and the next dawn. It was a small town in east Kansas, a farm town, population twenty-one hundred and forty-two, counting newborns. After, it held some four hundred terrified survivors; they dominated media headlines for a day and a half . . . until it happened again.

Within a month, it had happened twenty times, all over the world, and the pattern was emerging. An impenetrable bubble would appear, covering a small town, a few square blocks in a larger one. Inside, several thousand people would be trapped.

When the bubble lifted, only oldsters, amputees, babies without mothers, and a few rejected for no known reason, would be left. Eventually the authorities realized that the depredations were limited to particular bands of latitude in the northern and southern hemispheres. They evacuated those areas, except for China, which needed to get rid of excess population, and the abductions stopped, even in China. But by then . . .

Carlie was heading for the Sandwitch's when the Sun went out. She looked up and blinked, seeing that a mother-of-pearl dome that glowed with its own soft light had replaced the blue sky there seconds before. She knew what it was: there had been plenty of interviews with survivors. She also knew she had about five minutes before Stage Two. The screaming was already starting.

Once people had realized what was going on, the government had tried various methods of protection. All futile. Underground shelters were casually breached, their inhabitants as ruthlessly seined as the street-side cowerers.

None of the survivors had ever seen any of the unknown abductors. After five or so minutes, all within the dome lost consciousness. The ones who didn't "pass" awoke, safe and unharmed, several hours later, the dome gone, the majority of their companions gone.

Once, the only sure things in life had been death and taxes. Now it was death, taxes, and domes.

Carlie about-faced with a speed that would have gladdened a parade major's heart, and ran. As far as she knew, no one her age had survived simply by finding a cleverer hiding place. Nonetheless, she had marked out the best hideyholes she could at the bank she worked at, and also in her ancient labyrinthlike apartment, which had been converted clumsily from an old mansion.

If she couldn't escape, she wanted her coat. Others had jibed at her for carrying the heavy coat around in the heat of summer, but she couldn't tell what the temperature would be like wherever the snatchees were going. Assuming they weren't immediately killed and processed for some reason or another, that is. And she wanted that coat. People were taken with the clothes on their backs, and that was all. A man's wallet in his pants pocket went; a woman's purse didn't and neither did a hat not on the head.

She was counting under her breath and cursing that she hadn't bothered to carry the heavy coat the short walk to the sandwich bar. She slept in it, but she hadn't bothered to carry it for that little distance.

Others were running now, too, in blind panic, and she shouldered her way through a screaming, maddened mob. Someone knocked her purse out of her hand, and she left it. There was nothing in it she would probably need anyway.

Half a block, and the crowd of people seemed to be thickening between her and the door to the bank. She used elbows, feet, her head for a battering

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ram—

She burst into the bank, where her fellow workers were standing, staring, mouths agape. Boyd Jenkins yelled something at her, she couldn't tell what. She merely dove for the coat rack, thrust her arms into the thick garment, wrapped its weight around her almost like a blanket, and—

Woke up in what looked like a perfect duplicate of the bank, except that . . . she lay draped partly over a counter, half-dazed for long seconds, breathing slowly and calmingly, trying to figure out what was wrong.

There were plenty of figures stirring even as she was, moaning, blindly groping and trying to rise. She reached out a hand to the familiar countertop, and realized part of what was wrong. She knew that countertop, had loaded its pockets on many mornings with forms, envelopes, checked the pens on their chains to see that they all still wrote. The countertop looked right; but it felt wrong.

She was in a room that looked like the bank, but felt and—she wrinkled her nose, drew a deep breath—smelled wrong. A duplicate, accurate to the eye, but the surfaces subtly slicker, smoother-feeling.

She looked around at her fellow victims.

That was the second thing wrong.

There were many strangers, but that was to be expected, in a bank. But where was Boyd Jenkins, shouting at her just seconds ago? Where was Mr. Slivovitz, the manager, who should have been at his desk a few feet away? Where was—oh, God!

Where were all the men?

Once she had realized, she quickly checked. Unless that little child, sobbing beside a collapsed woman, was a boy, there wasn't a male in the room.

She managed to get her wobbly legs under her, vaguely pleased that the coat had come through. It was heavy and hot, since the temperature seemed warmer than the bank's controlled climate, but she had no intention of removing it. Not until she was sure what was going on, anyway.

It was then that she noticed how many staring heads were aiming out the window. She turned her own head, and scrambled up and out the door.

Across the street—wasn't across the street any more.

The well-known pre-World-War-One facade of shops had vanished. In its place was a row of one-story buildings built of stones ranging from pale blue to a warm peach, elaborately carved. The street had been split neatly up the center; concrete gray on one side, a very pale pink stone or hard tile surface on the other.

The people on the other side of the street were stirring, too.

People?

They weren't human.

And the "sky" was still mother-of-pearl.

Afterwards, Carlie couldn't have said which side reacted first. Did the women begin screaming, or the long-furred whatevers on the other side start yowling first?

Either way, both sides scrambled back to their respective buildings. Both sides cringed and flinched at the unspeakably different beings across the street.

Neither side made a move toward contact.

And it stayed that way, with the invisible line in the middle of the street as if it were an impenetrable barrier. Humans on one side; aliens on the other.

"It's perfectly obvious why we were snatched," Carlie muttered to herself, fiercely chopping celery. "All of us, only females. Brood mares." At least they had found stores of food. It looked right, smelled right, tasted right, and nobody had dropped dead from eating it—yet.

"'Cept for one thing." The person across the table from her, a tall slender black girl who had introduced herself as

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Barbra, continued to peel potatoes in neat, economical strokes.

"What's that?" Carlie wondered how long the food the women had found stacked in cellars and empty rooms and even in desks was going to last. And what would happen as it began to run out.

"Crosses." The black girl piled the peelings neatly up. "If they can be made, they're usually sterile." She grinned, neat small white teeth glittering faintly. "And I ought to know. I am—was—a biologist."

"At State?" Carlie asked, and Barbra nodded. "I was going to start there next winter. This was just my save-up-money time. . . ." Carlie's voice trailed off. For her, there would never be a State—now. "Barbra, if you are a biologist, *is* it possible?"

Barbra shook her head. "No. Most crosses are from closely-related animals. I can't tell without a lab, but I'd be willing to bet that these whatever-they-ares are completely different from us. I know." Her knife continued its neat work. "They're two-legged walking sapients, like us. Assumed sapients, that is." Both women smiled at the memory of the screams and howls of the original awakening. How, ever since, both groups had avoided the street, scuttling down the sidewalks warily, eyeing the other side every second, shrinking from even putting a foot onto the street.

"But," Barbra went on, "do you have any idea how complex our body chemistry is? Proteins, enzymes, what-have-you. And they've all got to match and work together. They may have similar, oh, say hormones, to ours. But similar isn't alike." A shrug.

Carlie was grinning wryly. "You forgot one thing. Whoever put us here had a reason. Unless you're one of the ones who think that the whatevers across the street are really the ones who put us here, and are just pretending to be afraid of us."

Barbra laughed. "It would be easier if they were 'them,' and not just fellow victims. Whoops. Survivors." There had even been arguments among the women about what to call themselves. Carlie thought that was one of the biggest wastes of time and energy . . .

"So." Carlie nodded. "Whoever 'they' are. With all the other science they've got to have, maybe they've got something to fix that too."

Barbra nodded. "I've thought of that. I have sickle cell—never mind. I have a disease. My medication was in my purse. Lost. But I haven't needed it."

Carlie's mouth twisted. "Wonder what else they did."

"I'm afraid to. I—"

Barbra's head turned, focused over her companion's left shoulder. Carlie blinked at her expression; she jerked her head around to see what had caused it.

"Uh-*oh!*"

One of the alien males was in the doorway. Carlie thought he was rather attractive, in the way a sleek panther is attractive. Well-built animal. He looked almost human, but none of the proportions was quite right—his features were subtly wrong. Light tilted eyes reflected his surroundings in a long, thin face. His chin was doubly cleft, two neat parenthesis grooves. His body was too short for the length of limbs, so that his hands almost reached his knees. His head hair was the color and texture of a pale angora cat, thick and waving. If he had external ears, they were hidden. The fur or hair continued in a line across his face, emphasizing the high cheekbones, thinning almost to nothing over the beak nose. The whole effect was a half-mask.

"Danjee." He placed his whole hand on his chest. "Danjee."

Neither of the women spoke.

"Danjee," he repeated patiently.

Barbra stood, changed her mind and sat again. There was a subtle change in the way she was holding the knife.

"Danjee," he repeated, touching his chest again.

Carlie stood up. "Carlie," she said,

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touching her own chest.

"Danjee." He touched his chest. "Carlie." He pointed at her, using his whole hand, vertical, which Carlie carefully noted, running various shows she had seen on different parts of the world through her mind's eye, wondering if other human cultures used a similar gesture to point.

"Carlie." She touched her chest. "Danjee." She tried to pronounce it exactly as he had, and pointed to him with her whole hand.

"Communication established," Barbra murmured. "The first step."

"Well," Carlie retorted, "I'd just as soon have him come openly, as sneak in when we're asleep."

Barbra shrugged. "Girl, look at history. What does it matter?"

"Relax and enjoy it? Not me!" To the alien: "Danjee." Pointing to a chair: "Chair." She walked over to it, held it. Said "Chair," again. Then, "Carlie sit chair." She suited action to words.

"Danjee chair sit," replied Danjee. Promptly sitting in another chair.

"Great," commented Barbra. "They don't even use the same sentence structure we do." But Carlie was already into lesson two. "Head . . . hand . . . arm . . . leg . . . body . . ." At which point Danjee decided it was his turn. So Carlie learned, quickly, the words for mouth, talk, stand, eyes; in one of the capacious pockets of her coat were a tablet and pencil. She pulled them out and quickly wrote down the words as he told them. He watched her for a dozen words or so, then came and stared over her shoulder. The spill of liquid syllables he uttered was obviously a question.

"Glee'annon," Carlie read back to him. "Carlie glee'annon Danjee. Danjee glee'annon—talk, in my language. Danjee glee'annon *with* Carlie. Carlie glee'annon *with* Danjee. Carlie *write*—" She made gestures so he'd understand, "—*with* pencil. Pencil." She held it up, handed it to him, took it back. It was a mechanical pencil, and she had two plus a box of leads, but she didn't want to lose even one. "Pencil. Carlie write. Carlie write with pencil."

"Coo, coo!" He did a hopping up and down dance, his head shaking the way a human's would to show 'No.' "Coo, coo, coo. Danjee harsty. Danjee harsty." (Carlie wrote "harsty = understand?") "Carlie write. Carlie write, Carlie with pencil write. Carlie glee'annon. Carlie with Danjee glee'annon. Danjee glee'annon. Danjee glee'annon with—" he turned to Barbra.

She frowned. "Barbra," she muttered.

"Coo, coo, coo." He shook his head in assent again. "Coo, coo. Barbra—" What followed was a meaningless flood of liquid syllables. He seemed to realize that there was a "failure in communications" again. Slowly, using his own words he taught them, and their words he learned, he got to why he had come.

"Not on your life, buster," was Barbra's remark, when she and Carlie understood.

"Oh, come on, I don't think he's inviting us to an orgy, Barbra."

"Why? Because it's light under the dome, and your culture prefers night and bedrooms for an orgy?" Barbra snorted. "For all you know, somewhere in all that, you married him and his six blood-brothers, and he's inviting you to come consummate the deal, because they only do it at noon."

"Well." Carlie worried her lip. "I'm going. Whatever it was, it was important enough for him to go through all this, when for all he knew, we'd've sliced his throat the instant he crossed the line." Barbra nodded. There were some of the women who would have. "The least I can do," Carlie said firmly, "is make some effort to find out why he took the risk." She unzipped the inner lining from her coat, took out the collapsible pack, added a few more items from those sewn into the lining, and stood up, to see Barbra watching her with a mixture of awe and amusement. "Take care of my coat, will you, Barbra?" A wink. "If I

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don't come back, it's yours."

"After what I've already seen come out of it," Barbra said, grinning, "consider it guarded with my life. I suspect it's worth it."

Carlie shrugged. "I like to be prepared." She settled the now half-full pack easier on her shoulders. "Lead on, Macduff."

Easier said than done. Danjee started her down the street, in full daylight. In seconds, the women were spilling out of the shops and pseudohouses, and already there was a dangerous-sounding murmur.

Carlie wasn't sure she could explain why she was going with Danjee. It was obvious from some of the expressions that some of the women thought they knew, and the lightest punishment she could expect from her outraged sisters was to have her head shaved. Then she remembered a 19th-century folk song that was one of her grandmother's favorites, sung when she rocked Carlie to soothe her after her parent's death, or filling the room with a gorgeous deep male voice singing it on Grandy's old-fashioned record player.

"Follow, follow, follow, follow the alien guy," she half sang, half shouted over the mutterings, changing the words to fit what she wanted to say. "Follow the alien guy. For somebody may be waiting, to show us the way to freedom, follow the alien guy." Danjee stopped and was staring at her, mouth dropping.

"For somebody may be waiting, to show us the way to freedom," she caroled, unable to remember any more. "Show us the way to freedom. Follow, follow, follow, follow, follow the alien guy." She wondered if Barbra or any of the other African-Americans would recognize it as an old Underground Railroad song, telling slaves how to find their way north by following the Big Dipper (the Drinking Gourd, in the original) to the north star.

A tall, slender woman who moved with the grace and poise of a jungle leopard moved out to the middle of the street and stood just on the woman's side. "This hairy bothering you, sister? I've already run him off once, but he must have sneaked around somehow."

"No," Carlie said. "He came over to tell us something, only he couldn't make himself understood, so he gestured I should come and he'd show me. I figured—" She slid her hand in her pocket and slid it out just enough so the other woman could see the tiny derringer. "What can I lose? Who knows, maybe the fence is down finally."

"You come back and tell us." The woman nodded. "You don't come back, and the next hairy who crosses the line—" She made a universal gesture and stepped back. Carlie looked up at Danjee, and had the oddest feeling that he understood, and, even odder, that he approved. Though surely that stretching of the mouth wasn't a grin.

"Carlie," he said. "Carlie with Danjee—" The rest was unintelligible, except that he repeated the phrase "with eyes Carlie" over and over. Until Carlie got tired and put her hand in his and tugged. "Stop jabbering, Danjee, and come on." It was like touching velvet, she thought in surprise.

It was also quite a walk. The bank had been near one edge of the area taken, and thus near one edge of the duplicate. But now they walked. Danjee started, at one point, to put a supporting hand under her elbow. She could almost see the wheels turning within that domed skull. She wondered if his people had a male superiority thing—if so, they hadn't acted like it up to now—or he was just polite, or—she grinned. "It's OK, Danjee. I'm tougher than I look."

A spill of liquid sounds was all the answer she got.

Why this one particular building was different from the rest she couldn't have said. They were all so alien in color, in style. But this one—she stopped, looked at it steadily. "Michelangelo would have loved it," she decided finally. Alien or

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not, it was the most gorgeous exterior she'd ever seen.

The word had evidently been passed, because several of Danjee's people came spilling out of the building, surrounding her, talking six to the second. Somehow she didn't feel frightened. They had such an air of children with a new toy, moving carefully about as though the least breath could break it, that she couldn't feel afraid. When Danjee gestured her inside the lilac and blush-pink doorway, she shrugged and went in.

Inside must have been made of some kind of plaster, the effect vaguely Moorish because instead of straight walls meeting ceiling, there was a curved arch overhead, with carved designs running over its entire surface. The colors were muted, a pale lavender fading into a soft blue and farther on into a green, but it wasn't unpleasant. She looked and looked some more. "It's beautiful, Danjee," she said.

"Carlie mubmuble?"

She ran a gentle finger slowly over a particularly graceful curve. "Ohhhhhhhh," she breathed, smiling.

He jumped back, tilted his head.

It was then she realized that she hadn't seen him smile—not once.

Deliberately she smiled.

He flinched.

She sighed. "Lovely," she said aloud. "A smile means something bad. I'll have to tell the others." Thinking about it, she rounded her lips as though expecting a kiss. She could almost see him relax. "Carlie come?" he said slowly.

She shook her head no.

His lips pursed, as his hand made what was obviously a "This way" gesture.

He didn't want to show her a hole in the fence. He wanted to show her a sick alien.

Very sick.

Even to Carlie's untutored eyes. He was lying on a quasi-couch, his eyes shut and his whole body wracked with convulsive tremors. It was hard to judge, but he seemed adult. He was emphatically male—no clothing, and his equipment looked human enough. She caught a scrap of lip between her teeth, and felt the high forehead. It seemed cold to the touch, and he stirred and made a protesting moan. She gestured Danjee closer with one hand, then felt his forehead. It felt cool and just slightly dampish to the touch. Velvet, whereas the other felt—she stroked the forehead again, crisp almost, like a human man who hadn't shaved, prickly.

"Sick, is he?" she asked Danjee. "But what can I do?"

The big eyes fixed on her. Plainly, she was to do something.

"Danjee," she said firmly. "Your people—Danjee not Carlie. Danjee fix," she patted the sick alien on the chest, and he moaned again. "Carlie not." Then she looked down again. The alien was limp, head askew, breathing with such obvious difficulty; she frowned, and leaned down and listened to his chest. Wheeze, rattle. Boy. Did he ever have fluid in his lungs. Unless . . . again she used Danjee as a touchstick, pulling him over and listening to him breathing.

All right, there was part of the problem. The alien had his version of pneumonia. She caught her lip again, looked up and caught Danjee's eyes, pleading. "Danjee," she said slowly. "Carlie fix Carlie. Not know how, fix," she patted the chest beneath her.

He understood that much. "Benzhi," he supplied.

"Benzhi." She tapped his chest. "Carlie fix Carlie. Carlie like to help, like to fix Benzhi—"

His mouth pursed, and he was shaking his head no with almost indecent fervor.

"Danjee—" She had, in fact, antibiotics in her coat. But whether they'd do more harm than good—and assuming she wanted to waste—she wiped that word out. These people—furred or not, they were people—had as much right to a chance as anybody else. Pneumonia

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had once been a killer. Still could be, to those vulnerable for some reason. But she'd better not risk the antibiotics, unless she became kill-or-cure desperate. Because who knows what they would do to, as well as for, Danjee's people? So OK, what else did you do for pneumonia victims?

God, but his breathing was getting worse as she listened.

She had always been a reader, historical novels a favorite, along with science fiction, romances, adventure, anything that attracted her. Hadn't she read about something called a croup tent, for babies with croup—wheezing, breathing difficulties? If she could set up a croup tent for Benzhi—

It took longer to explain, with her scarce pidgin and sign language, that she wanted cloths, a fire, and a fireproof bowl or container with plenty of water. There was a tremendous fuss when they realized she wanted a fire next to Benzhi, but Danjee seemed to have appointed himself her protector, and it was accomplished. Then she put the shallow ivory-colored bowl of water over it, and coughed herself as clouds of steam began to emerge. Even Danjee seemed suspicious of the next step, which was to hold Benzhi as close to the steam as she could manage, with cloths draping both their heads so that as much of the steam as possible went into both their nostrils.

It seemed an interminable time, but eventually, Danjee pulled her away and took her place, holding Benzhi's head over the steam, his black rimmed nostrils wrinkling. She backed away, then went and lay quietly in a corner, curled up, trying to get as much rest as possible.

It must have been hours later when an excited youngster—how she knew she didn't know, but she was sure he wasn't an adult—came in, spilled out an incomprehensible message, and Danjee grinned, the tips of pointed teeth showing. Carlie decided there wouldn't be any doubt what the aliens meant when he grinned like that. She only hoped it wasn't something she'd done.

"Carlie come Luccal," Danjee said. "Luccal," he tapped the newcomer.

"All right." She shook her head no. She looked at the patient. "Keep him breathing the steam, OK, Danjee?" she said, worried.

"Carlie come Luccal, *bly* Carlie come Danjee, Benzhi." he said.

"Ah." She almost nodded, then shook her head. "Carlie come Luccal, *bly* Carlie come Danjee, Benzhi."

"Coo, coo." He was shaking his head no, meaning yes, again.

"Yeah, yeah." She shook her head in agreement. "But how," she muttered, following the excited Luccal, "do you boys say 'no'? I have this feeling I'm going to need to know."

Barbra and the angry feminist were waiting on the "street," just on the women's side of the line. "You OK, babe?" Barbra wanted to know. "You've been gone a while."

"I didn't realize—no, don't come too close." She gestured the other two away. "I have to go back—"

"Why?" It was the feminist.

"Because—" She said and stopped. Why did she have to go back? Then, "Because I said I would. Because they need. But what they really need—Barbra, pass the word if there's a nurse or better still, a doctor among the women. They've got a durn sick man—"

"Man!" the feminist snorted.

"Whatever," Carlie said. "He's sick."

"So?" the feminist shrugged, but Barbra frowned. "And if it turns into an epidemic, and we get it?"

"They aren't human," the feminist grated. "They can't give us anything." It was obvious she meant more than disease.

"I don't know." Barbra frowned. "Humans can catch disease from animals that aren't even mammals—even from things like snails. Some microbes don't discriminate. I'll see who I can find, Carlie."

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"Good. I guess you just wanted to know I was OK. I am. I'm just out of my depth. I think the guy's got pneumonia, whatever, he's having a time breathing. Pity we don't have the hospital in this crummy fake set-up. An oxy tent might be just the thing for him."

"Or kill him. Just because a human uses a tent—" The feminist turned and stalked away, muttering. "I'll see what I can find for you, Carlie. We're bound to have somebody."

"Hope so. I gotta get back." Her mouth twitched. "You understand, don't you, Barbra? I just can't stand by and do nothing, when he's in such difficulties. I just can't. I mean, it doesn't matter, whether he's human or not, male or not, anything. Just that he needs."

"I understand. Bet you brought home baby birds out of their nests."

Carlie grinned. "No. Mom drew the line. She said if I touched them, the mother bird'd never take them back. But all the stray puppies and kittens—"

"Dope. I'll pass the word, though. How'll they find your patient?"

"His name's Benzhi. Or ask for Danjee. See you soon."

"OK. Luck with him." A pause. "If he dies—you don't think they'll blame you—or anything?"

Carlie shrugged. "Who knows. No choice, as I see it."

"Yeah. See you."

She may not have carried a black bag, but the bedside manner was obvious as soon as she stepped into the room. She wasn't wearing a coat, but she had on an odd pinafore apron with bulging pockets. She paused in the doorway, smiled, and stated, "I'm Phyllis Schlumberger. I'm an OB, but it's all we could come up with. Shall I take a look at the patient?"

Carlie stuck her head out of the tent. "Be our guest!"

Danjee, hovering, looked dubious. "Danjee," Carlie stated firmly. "Phyllis. Phyllis fix Benzhi."

"I hope so, anyway," Phyllis agreed, pulling a temperature strip from one of her pockets and laying it on Benzhi's forehead, then catching a limp wrist with one hand and popping the stethoscope against his chest with the other.

"Ichhh," she ejaculated, after listening for a few seconds. "Heartbeat's irregular, chest cavity—assuming they have a chest cavity, I can only assume their internal physiology is like ours—full of fluid. Bad."

"You can use Danjee to see what normal is," Carlie informed. "That's what I've been doing."

"Good thinking. Danjee—" He came over, stood staring down at the easily squatting woman. She rose, gray hair fluffing out with the movement, and stuck the stethoscope against his chest. He jerked, and she laughed. "It's not cold, I held it in my hand. Hold still, Danjee."

Carlie gave him a little shove from the back, and he stood still while the doctor listened to his chest and held his wrist long enough to at least get the pattern. "Say ahhhh, Danjee," she ordered.

He just stood, puzzled.

"Use me."

"Good. Say ahhhh, Carlie."

"Ahhhhh." Carlie stuck her tongue out as far as she could. Danjee jumped a foot. Carlie pursed her mouth. "Gestures don't mean the same for them. A smile seems nasty, and a pursed mouth is like a smile for us. Worse, a head shake we'd use to mean no is yes. I haven't figured out what no is yet."

"The sooner the better, though." Phyllis grinned. "For now, say ah, Danjee."

He flinched back, made a growling noise of repudiation.

Carlie slapped him lightly on one furred arm. "Say ah. Phyllis needs to look down your throat."

"Carlie—" The rest was pure gibberish.

"Say ah," she repeated.

He shivered, then shut his eyes and opened his mouth.

"Um." Phyllis peered in, using a small

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light. "Looks human enough, except for no tonsils. And he could have had those jerked. Let's take a look at our sick friend."

The rest of the examination was routine, and then Phyllis was shaking her head. "For an amateur, you spotted the problem and the best probable solution that you could supply. He has a tremendous amount of fluid in his lungs. The steam may help, but his heart may collapse first." She chewed her lip. "No choice. You think they'll let me operate?"

"Operate?" Carlie felt her jaw dropping.

"Oh, not a real job. But I need to insert a catheter, drain some of the fluid." She chewed her lip. "Better not try to put him under—God only knows what an anesthetic would do to him—so he'll have to be held down while the catheter's inserted. Won't be fun."

It wasn't. Danjee got the idea all right. He was to lie over Benzhi's legs and hold them down, while Carlie got the same job for his head.

But when Danjee realized that Phyllis was about to stick something into his companion, he let loose a verbal storm of protest.

"Danjee—" Carlie used all the arguments she could. It took the two quite a while, but eventually Danjee, grim-faced, was holding down Benzhi's lower torso and legs. The body bucked when the needle went in, but Phyllis persevered.

It was a long, long night.

But Benzhi survived. And from then on, if one of the groups inside the wall had a problem they couldn't fix by themselves, they went (gingerly) to the other.

Two months after that, the wall enlarged.

The women went immediately to examine what they had. Past the buildings was merely a lot of dirt. It was almost a disappointment when they found, after almost a full day's walk, that the wall was still there. They just had a lot more territory inside it.

Carlie was still the "ambassador" to the aliens, who called themselves Bistii. She went over, and they, too, were examining new territory. Instead of a circle under the dome, they now had a loooong cylinder, with the street and the buildings running down the narrow part, cutting the cylinder in even halves.

"Well," she muttered, "now we know how we're going to feed ourselves when our supplies run out. If only—"

Danjee came over, his mouth in a happy O. Carlie pursed hers, and suddenly, Danjee smiled. Carlie gasped, but the smile didn't look threatening. It looked like . . . a smile. Danjee squatted, and ran his hands through the dirt.

Carlie smiled broadly . . . and Danjee *nodded.* Carlie made a business of putting something in the ground, and watching it grow up and up.

"Coo! Coo! Yes!" said Danjee.

"Yes. Coo coo," Carlie agreed. Then she bit her lip. "Danjee . . ."

He looked worried. Was he just reflecting her worry?

Carlie held her hand out, palm up as though holding something. Then she took a tiny pinch from her hands, and planted her seeds. "Seeds, Danjee. Do you have seeds?"

He had early on either picked up the human gesture, or theirs was identical. He put his hand up, thumb and second finger very close together. "Little. Little little."

"Us, too, Danjee," she said in her few words. "Little, little." Pity they had eaten so many of the potatoes. The eyes left would have to be saved for planting.

Then he used the word she had taught him when they had set up the "hospital." The humans had one doctor, and a few tools. The Bistii contributed materials, and willing helpers. "Cooperate."

She put out her hand, and slowly, as she had taught him, he put his hand in hers and shook it. "Coo coo, Danjee. Cooperate." ■

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Schrödinger's Cat-Sitter

Illustration by F. Gwynplaine MacIntyre

And you thought you had trouble with jobs like this?

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Most family trees are either mighty oaks or weeping willows. The family tree of Smedley Faversham, however, bore no resemblance to any botanical life form except the species of tree that is known as a monkey puzzle. Smedley Faversham's family tree possessed branches that twisted through six dimensions of Space and two dimensions of Time, doubling back upon themselves to become roots which grew in the reverse direction. This was due to the peculiar nature of Smedley Faversham's family. Most of his in-laws were outlaws, and most of his relatives were time-travelers who propagated willy-nilly through multiple timelines. Most of Smedley Faversham's ancestors would not be born for many centuries yet—indeed, some of his ancestors would never be born at all—and most of his descendants had died long before he was born. On one fateful time-jaunt into the past, Smedley had gleefully murdered both of his grandfathers before his parents were conceived, just to see what would happen. (He had also wedded and bedded both of his own grandmothers . . . but we will draw a veil over the painful subject of Smedley Faversham's numerous wives, ex-wives, concubines, mistresses, mattresses and matrices. Suffice it to say that Smedley Faversham's DNA was spread far and wide across the tapestry of Time . . . and it had permanently stained the fabric.)

Smedley Faversham's bloodlines were just as tangled as his timelines, and much messier. But in all the pretzeled pedigree of his family tree, the one relative who struck the deepest darkest terror into Smedley Faversham's heart was a certain matronly female who time-traveled just exactly as she pleased, and who treated the laws of causality like her personal spittoon, to the point where not even Smedley Faversham could decipher his precise familial relationship to her. She was not precisely his aunt and she was not precisely his mother, and yet she was neither and both. He therefore referred to her, in muttered undertones, as Auntie Mater.

One fateful morning—most of Smedley Faversham's mornings had a tendency to be fateful—he was spending a quiet day at home, attempting to prevent the sinking of the *Titanic*. For an experienced time-traveler like Smedley Faversham, this should have been simplicity itself: a quick time-jaunt to 1912 would have transported Smedley to the deck of the doomed ship, whence a few words in the navigator's ear would have altered destiny and saved hundreds of lives. But Smedley Faversham seldom did things the easy way. Thus we find him seated on a couch in his holographic rumpus room in the year 2397, with a small wormhole suspended in midair directly in front of him. The far end of the wormhole was connected to a space-time nexus in the North Atlantic in April 1912, several hours before the *Titanic*'s collision with the dreadful iceberg. Smedley Faversham was busily firing gravitons into the wormhole, attempting to strike the iceberg from a distance and weigh it down with so much extra mass that it would sink before the great ship ever reached it.

But something was not right. In order to strike the iceberg with a sufficient number of gravitons, Smedley Faversham would have to calculate both the iceberg's precise position in space-time and its precise velocity through the North Atlantic current. Each time that Smedley Faversham calculated the iceberg's position, its velocity changed. Each time that he confirmed the iceberg's velocity, its position altered. Suddenly, Smedley Faversham came to the realization that the massive object which had struck the *Titanic* was not an iceberg at all, but a heisenberg: one of the dreaded navigational hazards which flit uncertainly through every timeline and make trouble for every chrononaut.

Smedley Faversham debated the mer-

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its of shifting the whole shebang into an alternate timeline, in which the *Titanic* escaped all the icebergs and got struck by a meteorite instead. Or he could alter history so that the *Titanic* arrived in New York's harbor in 1912 with nobody aboard, because all the passengers and crew had been abducted by aliens . . . preferably the same aliens who had already snatched the crew of the *Mary Celeste*. With infinite timelines available, the possibilities were limitless. Just as Smedley Faversham was considering his options, a larger and much more turbulent wormhole appeared in the center of his rumpus room. As this wormhole's event horizon widened, the smaller wormhole put its tail between its legs and vanished like a Chihuahua fleeing a Rottweiler. The smaller wormhole's few meager quanta of Paradox were sent scattering in all directions, but these were quickly engulfed by the larger wormhole and were added to its own Paradox quotient.

"Whose wormhole is this?" Smedley Faversham wondered aloud. "Is it possible that I'm coming yesterwards from the future to visit myself, and the person at the other end of this wormhole is me? If that happened, I'd be beside myself. With rage, I mean. No, this wormhole doesn't look like one of mine: the hemwork is too neat. Somebody else must be coming to visit me, then. But why would they need such a large wormhole? Its event horizon has already taken up most of my rumpus room, and it's still growing. Who could possibly . . ."

"*Smedley Faversham!* " bellowed a deep alto voice that Smedley recognized, and at once his blood ran cold. He quaked in his boots, and he quivered in his cummerbund. (We shall not discuss what he did in his underwear.) Now the wormhole grew wider by another nano-scoonch, and through its aperture stepped Smedley Faversham's Auntie Mater. She was a very large and formidable woman, and therefore she could only fit through a very large and formidable wormhole.

"Huh-huh-how nice to see you again, Auntie," Smedley stammered.

"Rubbish!" said Auntie Mater. "You've never liked me, and we both know it. When a man who can travel through all the infinite dimensions of Space-Time never bothers to visit his own aunt, then I know what an ungrateful nephew he is. Or an ungrateful son, for that matter. I've come six centuries and seventeen parsecs to get here, so the least you could do is offer me a chair." Without waiting for an invitation, Auntie Mater positioned her capacious *derrière* above the nearest chair, and began to sit down. Smedley Faversham cringed, because the chair was merely a holographic image made of polarized light-waves, which couldn't possibly support the substantial mass of Auntie Mater. Just as Smedley realized this, Auntie Mater deposited her avoirdupois in the chair, which held her weight in spite of all the laws of physics. Apparently even the laws of physics were intimidated by Auntie Mater.

"I've come here, Smedley, to ask you for a favor," his she-relative informed him.

"A fuh-fuh-favor?" Smedley stammered. "What fuh-fuh kind of favor?"

"I shall be attending a social function quite outside the boundaries of Space and Time," said Auntie Mater briskly, putting her feet up on a nearby ottoman. (The ottoman was actually a hologram just like the chair, but evidently the holographic ottoman was just as scared of Auntie Mater as the holochair was, because it performed the incredible feat of supporting her incredible feet.) "I expect to be gone only a few hours. But while I am away," said Auntie Mater, "I will be obliged if you would keep an eye on my weans."

Smedley Faversham's complexion, which was normally a pleasant shade of argyle, now turned dead white. "Your *weans*, Auntie? No! Not that! *Anything but that!* "

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This might be a good time to mention that Smedley Faversham's Auntie Mater was the proud mother of three small children: her *weans*, as she called them. Smedley had never been able to figure out whether Auntie Mater was his aunt or his mother, so he had no way of knowing whether her weans were his siblings or his cousins. Either way, he hated their guts.

Auntie Mater's three weans were named Lepton, Klepton, and Neutrina. Lepton and Klepton were two small obnoxious boys of thuggish manner, who gave every indication of being destined for careers as serial murderers. Their little sister Neutrina, on the other hand, was a sweet-natured and dimpled darling who could charm her way into your heart in a nanosecond . . . while at the same time picking your pockets, kicking your shins, and bashing your bazoo. She also beat up her two brothers at every opportunity. Smedley Faversham had crossed paths with this miscreant trio of weans in several different timelines, and the results were always the same: Lepton and Klepton were bad enough, but little Neutrina was the stuff of nightmares.

"You expect me to baby-sit your unholy offspring?" Smedley Faversham moaned. "Well, uh, I'd just love to help out, but I have an urgent appointment in a Null-universe, and . . ."

"None of your sauce, if you please!" said Auntie Mater, rising to her full height and seizing Smedley Faversham by one ear and his cummerbund, while she frog-marched him towards the wormhole that hovered patiently nearby.

"Auntie, wait!" said Smedley Faversham, who was forced to walk on tiptoe as Auntie Mater lifted him bodily off the ground. "Couldn't you hire a baby-sitter? I hear that Jack the Ripper is available. Let me just time-hop over to Whitechapel 1888, and I'll see if he's free. Or I've got this friend named Caligula who owes me a favor, and . . ."

"This is a family matter, and you are the only family member available on short notice," said Auntie Mater. (This was true. Auntie Mater's tachyon trail always preceded her trajectory through space-time: consequently, most of her relatives could see her coming, and they invariably ran away to hide in alternate timelines before she arrived. Smedley Faversham, however, never noticed his Auntie Mater's tachyons. This was because of his cheap aftershave.)

"Wait a minute, Auntie!" he protested. "Is this trip necessary? After all, you're an expert time-traveler. No matter how long you're away from your weans, you can always return to them at a point in the time-stream just after you left, so you would only be gone for . . ."

At that moment, Smedley Faversham was brought unwillingly into contact with the event horizon of Auntie Mater's wormhole, and his deep baritone voice modulated into a high soprano screech as the Doppler effect came athwart of his tonsils. The next thing he knew, he was materializing at the far end of the wormhole, inside a room that bore a distinct resemblance to a nursery . . .

Lepton and Klepton were up to their usual high jinks, low jinks, and intermediate bandwidths on the jink spectrum. They had stolen several fragments of various centuries which they were certain would never be missed, such as the eleven days in 1752 that vanished without a trace when Britain revised its calendar. All these contraband remnants of assorted centuries were now being affixed to the walls of the nursery by Lepton and Klepton with a staple gun, which they probably had also stolen. The decorative motif might have impressed Smedley Faversham, were it not for the fact that Lepton and Klepton had included in their time-collection a large fragment of the Dark Ages which was still infested with bubonic plague. By the time Smedley noticed this source of contagion, he had already acquired a

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matched set of buboes and he was frantically ransacking Auntie Mater's medicine chest for antibubo serum while his buboes grew steadily larger and more emphatic (and more *lymphatic*, too). Several valuable minutes were lost before Smedley discovered that the medicine chest was equipped with a time-lock on the outside and a chrono-flux field on the inside: when Smedley changed the setting of the calibrated dial to any random century, the medicine chest's interior was automatically time-shifted backwards or forwards to contain whichever antibiotics, pills, nostrums, quacksalvers, medical fads or curatives were available during that century. As his buboes attained critical mass, Smedley Faversham turned the time-lock all the way back to its Paleolithic setting, and opened the medicine chest to discover that it contained only a shaman's rattle and a few herbs. Turning the time-lock far forward to a twenty-first century New Age setting that looked promising, Smedley Faversham opened the medicine chest again, to discover that it now contained a shaman's rattle and a few herbs, plus a few meditation crystals and a CD recording of whale songs. Spinning the time-lock to a medieval setting, Smedley opened the medicine chest yet again . . . to discover that now it was chock-full of leeches. Finally, after chrono-fluxing the medicine chest's contents into the twenty-sixth century, Smedley located an antibubonic inoculant—it was Bubex, the leading brand, although at this point Smedley would have settled for an over-the-counter generic—and he was able to cure himself of the plague and return his full attention to Auntie Mater's weans, just in time to stop Lepton and Klepton from running with scissors.

Meanwhile, sweet little Neutrina was engaged in her own girlish pursuits. She had recently discovered a subatomic particle that is a by-product of the entropy process, which she called the *maturon*. Physical mass creates a gravity well that attracts this particle: therefore—the longer an object or organism exists within Time—the more maturons it absorbs.

When Smedley Faversham stepped to the center of the nursery and announced "It's time for little children to be in bed!" he was amazed to see Neutrina nod her head in agreement. A moment later, Neutrina activated her latest invention: a maturon-transfer device. Within moments, nearly all of Smedley Faversham's maturons were siphoned out of his physical mass and transferred into little Neutrina, turning the child into a willowy twenty-year-old woman while Smedley was transformed into a newborn infant. (Neutrina gained fewer years than Smedley lost, because several years' worth of Smedley's maturons were dissipated as heat loss.) "Yes, I agree: it's time for all *little children* to be in bed!" said the now-adult Neutrina as she seized the juvenized Smedley Faversham, neatly diapering him and depositing him into the crib which he had intended for her own occupancy.

At this point, Neutrina's plans for global conquest—or at least mastery of the nursery—were interrupted by Lepton and Klepton, who had stolen Neutrina's maturon device and were prying it open to see how it worked. The antiparticle opposite of the maturon is, of course, the *immaturon*. When Lepton and Klepton broke open Neutrina's invention, they unleashed a flood of immaturons which rejuvenized Neutrina, returning her to childhood and releasing the stolen maturons from her physical mass. Most of the maturons were absorbed by the nursery's outer wall, which immediately crumpled into dust as it became fifteen years older in mere seconds. Fortunately, the infant Smedley Faversham absorbed a sufficient number of maturons to bring him to the brink of pubescence: old enough for him to be able to recalibrate Neutrina's maturon-transfer device for his own agenda. The now-pubescent Smedley, determined to

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regain his full adulthood, explored the rooms of Auntie Mater's house in search of an object or household pet from which he could steal several decades' worth of maturons. Eventually, in Auntie Mater's fridge, Smedley found a meatloaf that looked like a suitable candidate for the time-transfer process. Using Neutrina's invention, Smedley transferred thirty years of accumulated entropy from the meatloaf into himself. This made the meatloaf turn younger as the adolescent Smedley Faversham became older. As he returned to adulthood, Smedley Faversham observed that Auntie Mater's youthened meatloaf now seemed more appetizing. In fact, the beef atoms in the meatloaf molecules had become so much younger that the beef was now completely revealed. Or re-*vealed*.

"Fascinating," said Smedley, as he watched the veal atoms alter the atomic structure of the meatloaf. (Beef and veal are, of course, two different isotopes of sirloinium.) "I should write a scientific paper about the Meatloaf Effect." He consulted a nearby Periodic Table of Aliments. "Let's see, now: what's the atomic number of meat? Is it 57? No; that's ketchup."

At that moment, three hideous shrieks erupted from the weans' quarters. Lepton, Klepton and Neutrina had started playing a friendly game of spin-the-quark, but none of them wanted to be the bottom quark, and now the game was turning violent. Smedley Faversham raced back to the nursery, ready to kick butt. Yet it was not to be. Lepton, Klepton and Neutrina were lying in wait, and they bushwhacked him. Smedley whimpered for mercy, but mercy came there none. Not until Smedley had stepped on Lepton, leapt on Klepton, and wept on Neutrina were the weans ready to listen to reason. Even then, Smedley had to construct a Möbius lasso that he used to ensnare Lepton and Klepton and hog-tie them into their beddy-bye. Meanwhile, little Neutrina had climbed into her own crib, unbidden. This astonished Smedley, until he discovered the reason: Neutrina had teleported a stink bomb into her brothers' bed, and Neutrina's crib was located in the only portion of the nursery upwind from the stink bomb's Ground Zero. Even the hole in the nursery's wall, created by Neutrina's maturon cascade, failed to provide enough ventilation to neutralize the P.U. effect. Smedley Faversham had to shove champagne corks into his nostrils to block out the stench as he surveyed the nursery and confirmed that, amazingly, all three little weans were tucked away in their jammies. Now, perhaps, some peace and quiet might . . .

"*Tell us a story, Uncle Smedley!*" squealed three high-pitched voices.

"A story, you want?" Smedley Faversham reached for his switchblade, then put it away again as he remembered that child-murder was illegal in this particular century. "You psychotic siblings want to hear a bad-time story . . . I mean, a *bedtime* story? Look, you brats are lucky I don't keelhaul your sweetbreads into the next millennium and . . ."

"If you don't tell us a story, we'll tell Mama you were mean to us!" said Lepton, while Klepton belched his agreement.

This was blackmail: in Smedley Faversham's fevered cerebellum, he now beheld a mental image of Auntie Mater venting her wrath upon him, full spleen ahead. "Um, let's not be too hasty," Smedley said, frantically scanning the room for any sort of storybook . . . preferably a large heavy one that he could use as a bludgeon. "A story, you wanted? How about a grim fairy tale . . . I mean, a Grimm's Fairy Tale?"

"I wanna hear a story about a *cat!*" shrieked Neutrina, and her brothers chorused their approval. Neutrina was very fond of cats, as she had demonstrated in a series of experiments with every cat in the neighborhood. (Among other things, her research had disproven the pesky misconception that cats have nine lives.)

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"A cat, you say?" Smedley Faversham asked. "As a matter of fact, I once met a cat in a situation much like this one, when I got stuck taking care of a monstrous little . . . *ahem!* Where was I? Ah, yes! Several centuries ago, I had a few minor difficulties while constructing a four-dimensional harmonic oscillator. Do you kiddies know what a four-dimensional harmonic oscillator is?"

Klepton reached under his bed, and produced a four-dimensional harmonic oscillator that was still bearing the manufacturer's tag and a price sticker from Oscillators-R-Us. Smedley Faversham whistled in astonishment: "Where did you get *that* little item, sonny-boy?"

"Found it," said Klepton, concealing the evidence under his pillow.

"Well, that's kids today for you," said Smedley Faversham. "You've all got your own ready-made four-dimensional harmonic oscillators. In *my* day, we had to build our own or do without. When I was your age, I didn't even have two tesseracts to rub together, and . . ."

"What about the cat, Uncle Smedley?" asked Neutrina.

"Oh, yes. The cat. Well, I was having trouble with my four-dimensional oscillator, and of course there's never a quantum mechanic around when you need one. So I decided to travel back in time to Zurich in 1926, to meet . . ."

"Why is everything going all blurry?" Lepton asked. This was a very sensible question, since at this moment the entire Universe was indeed going all blurry.

"Yes, and where's that spooky music coming from?" asked Klepton. This too was a fair question, since weird electronic music was now emanating from no discernible source.

"That's the flashback effect," said Smedley Faversham. "The blurring and the background music are cues to indicate the beginning of a flashback sequence. Now, as I was saying: I traveled back in time to Zurich in 1926, in search of the only man in that particular timeline who could help me with my four-dimensional harmonic oscillator . . ."

"This must be Switzerland," said Smedley Faversham, as he stepped out of a standard-issue Flashback Sequence wormhole and looked around. "I can usually tell, because most regions of Space-Time resemble the *cheese* from that same region. Switzerland's space-time continuum is full of holes, like Swiss cheese. French space-time is thick and veiny, with edible mold, just like Roquefort . . . and Holland is encased in a spherical space-time vortex with a red outer layer, just like Edam and Gouda. In the United States, the space-time continuum comes in convenient slices, individually wrapped. England occupies a space-time continuum that is hard and yellow, like cheddar. And whenever I enter the crumbly white vortex of space-time surrounding Wales, I have to proceed very Caerphilly. The only exception is Italy, where the space-time continuum resembles spaghetti, and Gravity functions as the marinara sauce. Now, where and when exactly *am* I?"

Smedley Faversham cased the joint. He was standing in a sparely-furnished room of no discernible housekeeping. Books and manuscripts were stacked on every horizontal surface, and threatened to take over the vertical ones.

"*Wer kommt?*" said a voice from the next room that spoke with an Austrian accent. (The *voice* had an Austrian accent, not the room.) Smedley Faversham, hearing this interrogation, perceived it instantly to be "*Who comes?*" The Gentle Reader may have noticed that all fictional time-travelers possess the quasi-magical ability to comprehend the languages of every century they visit. Smedley Faversham, however—being a real live flesh-and-blood time-traveler, not a fictional one—had no such convenient advantage. But he had no language barrier either, because this flashback sequence was equipped with subtitles.

"*Who comes?*" the questioner repeat-

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ed, and into the room came a studious-looking man who was five feet six inches tall in Space and thirty-nine years long in Time. He was emaciated—looking pastwards, Smedley yesternoticed a seven-month bout of tuberculosis in this man's timeline—and he wore a threadbare suit and a pair of steel-rimmed spectacles. The man entered the room just as Smedley Faversham was closing his wormhole and fastening the zipper; as he witnessed this anomaly, the threadbare man gasped audibly and took off his eyeglasses, which he polished rapidly on his sleeve.

"*Guten Abend,*" said Smedley Faversham, keeping one eye on the subtitles so that he could conduct a two-way conversation. "Do I have the honor of addressing Erwin Schrödinger? And is today July eleventh, 1926, shortly after you submitted your series of essays on wave-mechanics quantum theory to *Annalen der Physik?*"

"You do, it is, and I did," said Schrödinger, yanking open a nearby valise and hastily stuffing it with several rumpled garments and a slightly less rumpled toothbrush. "And whatever you're selling, I have no time for you. I'm leaving for Stuttgart today, and then I plan to spend a few days in Berlin at the home of my good friend Max Planck and his wife."

"You're going to board with the Plancks?" asked Smedley woodenly, as Schrödinger continued scurrying hither and yon amid the unkempt quarters, plucking galoshes and notebooks from crannies and shelves and cramming them into his valise. "As for having no time, that's why I'm Herr, *mein here* . . . no, I mein . . . I meant I *mean* that's why I'm *here*, mein Herr: I've got Time enough for both of us. Just a moment ago, you saw me step out of a hole in midair. I'm obviously a visitor from some future timeline, with vast knowledge of the mastery of Space and Time and all that stuff. And yet here you go packing your portmanteau like I'm chopped liver. I would think that a scientist like you would drop everything for a chance to schmooze with me."

"Why should I?" said Schrödinger, as he picked up three socks—no two of them matching—and crammed them into his tuckerbag. "If I stop to listen to you flapping your yap, I'll miss my train. You're a time-traveler, so you can visit me at any point along the one-dimensional line between my birth and my death . . . which means there's no need for me to listen to you *now*. In fact, for all you know, at some point in the future of *your* timeline you'll come back and visit me at some point in the *past* of *my* timeline . . . so I remember everything you'll tell me later, because it's already happened, but *you* don't remember it because it hasn't happened yet."

"Spoken like a true chrono-theorist, I guess," said Smedley Faversham. "And that's why I'm here: I need your advice. I'm having trouble with my four-dimensional harmonic oscillator. Every time I try to extend the Hilbert space, the Pauli matrices keep undergoing . . ."

"Actually, I'm glad you came," said Erwin Schrödinger, slamming his overstuffed valise against the floor and jumping up and down on it in a frenzied attempt to shut the thing. "Please excuse the disarray in my flat; I am temporarily separated from my wife Annemarie, and I cannot afford a housekeeper. My annual stipend from the University of Zurich is only 14,000 Swiss francs."

"I don't know beans about francs," said Smedley Faversham. "Are Swiss francs anything like Swedish meatballs? And why are you glad I'm here?"

"Because I need someone to keep an eye on my flat while I'm gone." Erwin Schrödinger's pale blue-green eyes peered intently at Smedley Faversham through his spectacles. "You're hired. No pay, of course. Clean up the place *ein klitzekleines* before I come back, *ja?*"

"You trust me to house-sit your apartment?" asked Smedley. "But you don't

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even know me! I could be a trans-dimensional murderer, or a paradox-thief, or . . ."

"Paradox, schmaradox," said Erwin Schrödinger, his satchel still yawning agape as he pressed it against the nearest bookshelf and put the full weight of his emaciated figure into his struggle to fasten shut the glutted gladstone. "Whoever you are, you can warp Time and Space like a cheap suit, so if you wanted to kill me or steal something I couldn't possibly stop you. Ergo, I might as well trust you. You need my advice, you said? Well, there's no free lunch: at least not in *this* universe. To get a favor, you should do a favor. So! You keep an eye on this place while I'm gone, and when I come back from Berlin we can talk about quantum mechanics all night like a pair of interdimensional yentas. Deal?"

"Umm, I've never done any house-sitting before," Smedley Faversham protested.

"What's to know?" said Schrödinger. "Just answer the phone, take care of the deliveries, *und so weiter*. Help yourself to anything in the icebox, and if you can't find something it's probably in the schrank."

"The *schrank?* " Smedley asked, consulting his subtitles to see if he'd heard this correctly. He opened a text window in the subtitles, and checked the definition: *SCHRANK. A two-doored wooden cabinet of German origin, containing drawers or shelves on one side and a storage space on the other.* Sure enough, a nearby piece of furniture answered to this description. (But not out loud, of course.)

"Oh, I almost forgot: you should water my plants." Schrödinger scurried off into the next room again, gesturing in transit at a garden-box on the windowsill.

"But, Herr Schrodinger . . ."

"The name's *Schrödinger*, please. *Mit einem Umlaut*," said Schrödinger from the next room.

"Sorry," said Smedley, adjusting his subtitles to include the two little dots in the physicist's name. "I'm always leaving out the umlauts. I once time-traveled to Bavaria in 1427, during the Great Umlaut Famine when the umlaut crops failed. The peasants had no umlauts at all, and the wealthy people had to ration their umlauts. Two burgomeisters broke an umlaut in half so that they each had one dot, and . . ."

"Speaking of breaking things," said Erwin Schrödinger, returning with another valise, "that reminds me: while I'm away, you should take care of my wife's Tibbles."

"Take care of your wife's tibbles?" Unsure of what a tibble might be, Smedley Faversham consulted his subtitles again, but found no definition for this unfamiliar term. Smedley was cranking up the search engine for information about tibbles when a sudden breeze rushed past him. He looked up just in time to see Erwin Schrödinger, a valise under each arm, scuttling out the front door as it slammed shut behind him.

"Herr Schrödinger?" called out Smedley, remembering to add the umlaut this time. "Could you reverse your polarity and come back here, please?"

No response.

"He didn't even wave goodbye," said Smedley Faversham. "I guess Schrödinger has no wave function. And I don't know what he wanted me to do with his wife's tibbles: I've never done any tibbling, and . . ."

"*Mrrrowww!*" said an indignant voice at ankle level, and Smedley Faversham looked down to behold a large spheroid of tawny marmalade-colored hair. The orange hairball came waddling forward on four stumpy legs. On the rear of this fat object was a tail, and on the front was a whiskery protuberance that now opened its jaws to display a pink tongue and emit the stench of rotten fish.

This creature was, most definitely, Tibbles.

"Oh, Götterdämmerung!" said Smedley, disenabling the subtitles so that no-

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body would be offended. "How was I supposed to know that Schrödinger had a cat? He never mentioned a cat! I can't take care of a cat! I don't know anything about cats!"

"*Mrrrowww!*" said Tibbles again, as he stalked arrogantly towards Smedley Faversham and glared resentfully through baleful yellow eyes. And although Smedley Faversham's subtitle software lacked an option for translating Cat-speak, no translation was necessary. Because this feline message could have only one possible meaning: "FEED ME!"

Erwin Schrödinger's third-floor walk-up apartment was small and cramped—just what one might expect for a lowly physics professor, circa 1926—and yet Smedley needed several minutes to reach the kitchen, due to an obstacle course of books and papers in the intervening space-time. The insistent yowls of the hungering Tibbles did not help matters. The icebox, when Smedley finally located it, was indeed an *icebox:* an old-fashioned insulated wooden cabinet, with a compartment at the top for a large block of ice and a dripping pan on the floor beneath. Meanwhile, the yowls emanating from Tibbles were getting louder and more frequent. The tubby tabby Tibbles was clearly on the brink of starvation, notwithstanding the evidence of his voluminous waistline. The feline tub of lard was very nearly spherical. And hungry.

"Help yourself to anything in the icebox," Schrödinger had told Smedley Faversham. Now Smedley yanked open the icebox's door, and beheld . . . three bare shelves, a thin layer of dust, and a slightly-gnawed *Pfannkuchen*. Nothing remotely resembling cat food. Or Smedley food, either. There wasn't even any ice.

"*Mrrrowww!*" yowled Tibbles, sharpening his claws on Smedley's trouser legs.

"I didn't come here to feed felines or to nursemaid nasturtiums," said Smedley Faversham. "All I wanted was to ask Professor Schrödinger a simple question about multi-dimensional oscillation harmonics and the Kustaanheimo-Stiefel transformation of quantum space-time. What could be easier than that? I think I'll just step off the timeline altogether, and take a short cut futurewards to the moment when Schrödinger comes home from Berlin. That way I won't have to wait for him, and . . . *OH!*"

A sudden pang caught Smedley painfully. At first he thought that his conscience was bothering him, until he remembered that he'd already had his conscience surgically removed. Besides: the pain of this particular pang was in Smedley's right ankle, where his conscience had never been located. Now he looked down and saw that Tibbles was sharpening his claws on the aforementioned ankle, all the while yowling louder in cat-speak: "FEED ME!"

"Let me see," said Smedley Faversham, flinging one of Schrödinger's notebooks at the flabby tabby so that it disengaged his flesh. "If I time-jump ahead to Schrödinger's return, this apartment will still travel forward in linear space-time with nobody taking care of it. Which means that all the houseplants will die, the deliveries will pile up on the doorstep, and the cat will starve . . . no, actually, this cat is the size of a bowling ball, so I doubt that it would *starve* exactly. But when Herr Schrödinger finds out I haven't taken care of his apartment, he'll be too angry to tell me what I need to know about harmonic whatchahoosits. Of course, I could always go *backwards* in time, and meet Schrödinger in 1925, so he won't remember that I've already met him in 1926. Who says you never get a second chance to make a first impression?" Smedley brightened at this paradoxic notion, until he saw the flaw in it. "Oh, nertz and nexuses! I picked July 1926 as the best time to meet Schrödinger, because that's when he'd just finished his greatest work in quantum theory. If I go

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back any earlier in his timeline, he won't know the answer to my question yet, and I'll never find out how to tweak my quanta like I wanta. If I'm ever going to get Schrödinger to answer my question, I guess I'll have to be his house-sitter after all. Now, what should I do first?"

From the floor came an insistent response in cat-language: "FEED ME!"

By now the yowls were accompanied by a scraping sound: Tibbles was bumping his head against a gray Bakelite object with a concave surface uppermost and one side bearing in crude Fraktur lettering the inscription Tibbles. The cat's food dish.

"I'll have to go out and buy some cat food," said Smedley. "But this is Zurich in 1926, and I don't have any Swiss money. Not even a groschen to buy groscheries. Not even a pfennig. Pfooey! Wait a minute: there's no reason I need to go shopping *locally* . . ."

So saying, Smedley unfolded his wormhole and jaunted forth among the infinite tangents of space-time in search of someplace that sold cat food. The thirty-ninth century A.D. was especially noted for its excellent cat food, but when Smedley got there and tried to buy some he discovered that he'd used up all his credit in that particular century. In several other millennia, too, his reputation had proceeded him. Finally, Smedley zipped back to ancient Rome just long enough to steal a magnificent sturgeon from the banquet table of the emperor Nero while that gentleman was busy in the vomitorium. "I guess Nero doesn't know that I'm stealing his supper while he's losing his lunch," Smedley said as he purloined the sturgeon. Concealing this contraband in his cummerbund, Smedley stepped back into his wormhole and reset its coordinates for Zurich 1926.

"When Nero finds out I swiped his dinner, I hope he doesn't try to get revenge by pulling some dumb macho stunt like invading Byzantium," said Smedley Faversham, holding his nose as he found himself zooming forward in Time while occupying a very small wormhole alongside a very large sturgeon, "It would be just my luck to emerge in 1926 and discover that the entire course of history has changed, just because I stole some old Roman's damned fish."

Smedley Faversham stepped back into Schrödinger's apartment one nanosecond after he'd left, and found Tibbles waiting for him. "*Komme hier, meine vergammelte Katzenschmutz*, you lousy fleabag," said Smedley, waving the sturgeon. "Look what I've brought you."

Tibbles sniffed the air with his little pink nose, then suddenly arched his spine and he *hissed*.

Once again, no translation was needed. In his hasty getaway from Nero's reign in 59 A.D., Smedley had failed to notice that his stolen sturgeon was protruding halfway out of the wormhole during its long trip forward through the time-currents to 1926. Consequently, the fish had been ripening steadily for the past nineteen centuries, and, um, . . . well, *yecch*.

"Capital P, capital U!" said Smedley Faversham, as he opened the nearest window and flung the rancid sturgeon out into the Zurich *Nebenstrasse*, closing the window quickly as the frenzied cries of "*Gott in Himmel!*" from pedestrians below reached his ears. Meanwhile, the yowls of the famished Tibbles were more demanding than ever: "FEED ME!"

"I never knew that one damned cat could be so much trouble," said Smedley Faversham, as he ransacked the Past, the Future, and various alternate realities in search of cat food. "Maybe I should just go back thirty million years to Olduvai Gorge, and shoot the first prehistoric felinid who crawls out of it. That way I could eliminate the whole family *Felidae*, and good riddance. But then Schrödinger might never tell me what I need to know . . ."

And so it went. Several centuries' sam-

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ples of succulent sweetmeats were paraded through the space-time nexus of Erwin Schrödinger's kitchen, but the cat would eat none of them. Each time that Smedley Faversham returned to Zurich 1926 and deposited his latest blandishment in the food dish marked TIBBLES, invariably the cat turned up its snotty snoot and yowled disdainfully at every offering. And yet the furry fiend demanded to be fed.

"I've tried every food I can think of in sixty-two timelines," said Smedley Faversham. "In fact, I've tried every known nutrient except prehistoric Siberian mammoth. Oh, what the heck . . ."

Smedley set course for Mesolithic Siberia, where he knew a nomadic tribesman who could give him a good price on woolly mammoth. Sure enough, the local mammoth-monger was perfectly willing to do business, since the Stone Age tundra was perhaps the only place in space-time where Smedley Faversham had not yet maxed out his credit. A deal for mammoth-meat was quickly transacted. But there was one minor detail . . .

"I have to take *the whole mammoth?*" asked Smedley Faversham incredulously, shivering in the Siberian midwinter while he wished that he had worn his mukluks and his snuggies. "Couldn't I just buy a few mammoth giblets to go, or some Mammoth McNuggets?"

"Take it or leave it," said the mammoth-meat merchant, gesturing towards a nearby prehistoric mammoth that was freshly slaughtered, skinned, dressed and guaranteed to provide many hours of good eating. "You think I'll cut up a whole mammoth just so you can have a couple of sandwiches, and leave the rest of the mammoth stinking up the permafrost? Either you buy a whole mammoth here in Siberia, or you can take steppes elsewhere."

"Let me handle the puns, Nanook," said Smedley Faversham as he grudgingly purchased the smallest possible Siberian woolly mammoth and adjusted the diameter of his wormhole so that he could fit the entire carcass inside. "So far so good," said Smedley, as he and the dead mammoth zoomed futurewards to 1926. "Now how will I get this whole mammoth inside Schrödinger's apartment? He was expecting me to *clean up* the place, not to add to the clutter. And what will I do with the leftovers? I hope that the University of Zurich has a department of paleontology . . ."

When Smedley Faversham returned to Schrödinger's kitchen in 1926 with his dinosaur din-din (woolly mammoths are not technically dinosaurs, but Smedley couldn't resist the wordplay), he was greeted by a joyous feline yowl. Instantly, a large tawny hairball flung itself upon the gargantuan prehistoric carcass and began to feed.

"That ought to keep him busy for a while," said Smedley as the finicky feline attacked the mammoth. "Although, if any cat in the Universe can eat a whole Siberian mammoth and still be hungry, this cat is the one."

By now the floor joists beneath Schrödinger's apartment were creaking dangerously under the dead mammoth's weight, while the ceiling joists above were threatened equally by the height of the immense beast. Calculating that one percent of the mammoth's total mass would be enough to keep a cat fed until Schrödinger's return, Smedley cut off that portion and put it aside. Now he had to find someplace in the space-time continuum where he could dump ninety-nine percent of a rotting mammoth carcass without anybody noticing it. The obvious place for this was the 1968 Democratic convention in Chicago, so Smedley set his wormhole's controls accordingly and dumped the evidence.

"Righty-ho," said Smedley Faversham. "The cat's fed, the garbage is taken out, and all's well with the world. What's my next . . . *Hey! Stop that!*"

Smedley Faversham's protests fell on deaf ears . . . or rather on cat ears, which

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pretty much amounts to the same thing. Tibbles, having temporarily sated his hunger, was now squatting in the middle of Schrödinger's living-room carpet and demonstrating that the digestive tract of *Felis domesticus* is designed for egestion as well as ingestion.

"Scat!" said Smedley Faversham, in several senses of the term. "Now I'll have to clean that up, you fat furball! Aren't cats supposed to use a sandbox, or something?"

A search of Schrödinger's bathroom produced more notebooks and papers, and a catbox which Tibbles had evidently used very attentively in the distant past . . . and which had not been cleaned recently. "Capital P, capital U, exclamation point!" said Smedley Faversham, as he opened the bathroom window and dumped the catbox's contents into the Zurich *Seitenstrasse*, closing the window quickly as the frenzied cries of "*Ach, du lieber!*" from pedestrians below reached his ears. Reactivating his trusty wormhole, Smedley calibrated its chronospatial controls to the Sahara Desert, ten seconds into the future, figuring that a handy sandstorm would blow enough sand into the wormhole to refill the cat's sandbox.

But Smedley had neglected to adjust the aperture of his wormhole. Its diameter was still calibrated to accommodate a Siberian mammoth, and so—as soon as Smedley opened the wormhole—an entire Sahara sand dune gusted into Schrödinger's bathroom, filling the catbox to overflowing and nearly smothering Smedley Faversham underneath a ton of sand.

"I can't under-sand what I'm dune wrong," said Smedley, struggling to the surface of the onrushing sandflow and shutting off the wormhole. The floor joists were creaking again under the weight of the sand dune. Smedley considered opening the window and dumping the whole ton of sand outwards, but a glance through the bathroom curtains to the street below revealed that a horde of torch-bearing Swiss burgomeisters were already forming a lynch mob. "Guess I'd better not throw anything out the window for a while," said Smedley. "No, wait: those Swiss burghers are only peeved because I keep dropping things *down* on them. They can't complain if I drop something *up*."

So saying, Smedley took a fresh packet of antigravitons out of his cummerbund and mixed them freely with the sand, setting aside enough sand to keep Tibbles happy until Schrödinger's return. This time, when Smedley opened the window, the antigravitized sand dune obligingly fell *upwards* into the sky over Zurich, rising above the Gothic spire of the nearby Fraumünster cathedral and blotting out the midafternoon sunlight, thus plunging all of Zurich into premature darkness.

"I hope Switzerland doesn't have any vampires, because they'll all come out early tonight," said Smedley Faversham. "In fact, just the idea of a Swiss vampire makes me sick. Can you imagine a yodeling vampire? And could you kill a Swiss vampire with a Swiss stake? Hmm, I see that the sudden eclipse has dispersed the lynch mob. Now it's time for . . . *Hey! Stop that!*"

Erwin Schrödinger's bedroom was barely large enough to accommodate the double bed that stood against its northern wall. This being July, the blankets were absent and the bedsheets and mattress were exposed. In the center of the mattress now squatted Tibbles, demonstrating yet another biological function of the feline anatomy. "*Meeowww,*" he announced, and if a translation for this were available, it would be: "*Let us spray.*"

"Leave it to cleaver," said Smedley Faversham, as he selected a meat-ax from the Schrödinger pantry and proceeded to chase Tibbles. "I hope this century doesn't have any pesky laws against cat-homicide. I remember once in ancient Egypt, I got sentenced to five thousand years of hard labor for at-

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tempted cat-murder, but . . . hey, get away from there!" This command was directed at Tibbles, who had scurried into the kitchen and gone back for second helpings on the remaining portion of Siberian mammoth. "I refuse to go time-shopping for any more Tibble nibbles, you felonious feline, so this meat has to last until Schrödinger gets back," said Smedley, picking up the leftovers while Tibbles protested. "Now, where's the icebox?"

The icebox was in the same place where Smedley had left it, thus disproving chaos theory. But when Smedley looked inside the icebox, he discovered that no ice had magically appeared since the last time he'd looked. "If this mammoth meat starts to spoil, the cat won't eat it," said Smedley Faversham. "And if the cat doesn't get fed, then Schrödinger won't answer my question. A classic chain reaction. So I'll need a good supply of ice. When the iceman cometh, I'll asketh him for . . ."

A loud knocking sound interrupted Smedley's thoughts. "Either there's someone at the door, or that's a poltergeist," he decided. "I wonder if a Swiss poltergeist eats knockwurst. And that's the wurst pun I've ever . . ."

The door burst open violently and Smedley beheld a very large Germanic tradesman, a veritable two-ton Teuton. The long steel tongs in his fist and the thick waterproof pad of black rubber on his shoulder indicated that he was an iceman. The look of Wagnerian fury on his face indicated that he was angry.

"Nice century you've got here, *mein Herr*," said Smedley, checking to make sure that his subtitles were activated. "I'll have one quart of your best ice, please. Imported, not domestic."

In a guttural accent, the iceman replied: "I'm here for the money."

"Aren't we all? But I still need . . ."

"The money, *ja?*" The iceman thrust a waterlogged account-book under Smedley's nose. "Herr Schrödinger has not paid me for my last three deliveries."

"Don't lose your cool, iceman," said Smedley Faversham. "I'd gladly settle the account, except I left my wallet in another millennium. But I can offer you my personal I.O.U. for . . ."

The tradesman grunted ominously. "That won't cut any ice."

"Let me handle the puns, Hans," said Smedley Faversham, taking out a deck of marked cards and shuffling it. "You look like a sporting man, so here's a proposition. Let's cut for high card: if I win, you'll go back downstairs and lug a nice big block of ice back upstairs for me. Not to keep, of course: I'll let you have it back as soon as I'm done with it. And if I lose—which has never happened yet with this particular deck—I'll gladly . . . *Ow!*"

Smedley's next few words had no translation. As the iceman stomped off into the outer darkness, Smedley consulted his reflection in Schrödinger's bathroom mirror and saw a bruise shaped like a map of the *Schwarzwald* where the iceman's huge fist had given him a black eye and violated the Hans-off policy.

"Ice suppose now the cat food will spoil, and Tibbles won't eat . . . and then Schrödinger will never answer my questions," said Smedley. "So, how can I get some ice?"

A quick experiment verified that the taps in Schrödinger's bathroom were working. Smedley filled Schrödinger's bathtub with tepid water, then added some Therm-No-Dyna-Mix: guaranteed to reverse the flow of entropy. Instantly, half the volume of tepid water boiled off into a thick cloud of steam while the other half congealed into a large cake of ice. "That's more like it," said Smedley Faversham, picking up the huge ice-cake and breaking off a small piece—a mere cupcake—to put on his swollen black eye while he replenished the icebox. "Now, what do I have to do next?"

The answer was obvious. "This place is so messy, you'd think I lived here," said Smedley Faversham. "Schrödinger's

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apartment is almost as messy as my own bachelor pad. Maybe even messier. This place should be in the Messier Catalog. Just because Schrödinger's wife isn't here to clean up after him is no excuse for him to be allergic to housework. The Y-chromosome does not contain a genetic exemption from housecleaning . . . except in my own case, of course," said Smedley. "But how can I clean up this place without doing any actual work?"

For once, Smedley's ingenuity seemed doomed to fail. A convenient antimatter vortex would easily clean out the Schrödingers' apartment *entirely:* removing dust, dirt, furniture, wallpaper, notebooks, oxygen supply and Tibbles the cat, as well as endangering the building and possibly most of the neighborhood. But Smedley Faversham was reasonably certain that Erwin Schrödinger did not wish to come home to a gaping crater where his residence had been. No; the trick was to remove all the grime, mildew, and cat-mess without removing anything else. This called for an algorithm that could distinguish between dejecta and desiderata.

"Maybe something in the schrank will help me clean this apartment," said Smedley, going towards the double-doored object in the living room. "Herr Schrödinger told me to look in here if I needed anything. I wonder if they had cabinets like this four hundred years ago in Two-Door England."

The left side of the schrank, when Smedley opened its drawers, contained nothing but an old Geiger counter, a hammer, and a chemist's bottle with a faded label on its glass exterior and a slight residue of some colorless liquid within.

"I can't do anything with this junk," said Smedley, closing the left side of the schrank and opening the right side. "Maybe something in the other side will help me clean up this place."

The right side of the cabinet contained a mop, a broom, a washbucket, a box of detergent, and an assortment of loofahs. "Nope, nothing useful in there either," said Smedley, closing the schrank again. "I need something that will do the housecleaning all by itself with no assistance from me, unless of course I get to supervise and give orders. Wait, that's it!"

Smedley reached into his cummerbund and took out his Junior Jumbo Nanotech Kit. Within moments, he had constructed a self-replicating nanobot, which immediately began replicating more nanobots exactly like itself. Smedley programmed the nanobots to scan solid matter at the molecular level, and then to break down the atomic structure of anything that qualified as filth (except Smedley himself, of course). In nanoseconds, a thick fuzz of microscopic minions swiftly spread across the walls, floors and ceilings as billions of nanobots did their stuff.

"Hey, this might actually work!" said Smedley. "I wonder if . . ."

A feline screech erupted from the bedroom.

Smedley came running. The nanobots were programmed to recognize dirt in all its myriad isomers . . . and, contrary to rumor, cats are not particularly clean. Any animal whose idea of a bath consists of licking itself all over is none too likely to be sanitary, especially if it licks itself with a tongue which has recently encountered raw fish or any of the other gourmet delights which cats eat. The nanobots identified Tibbles as a large untidy hairball—a reasonable error—and now they were swarming over him, attempting to break down his atomic structure.

Smedley's instinctive urge to sit back and watch the fun was perturbed as he remembered something. "You nanoninnies, stop eating that cat!" he said, desperately trying to rewrite the nanobots' algorithm while the nanobots were rewriting the cat's genome, one cell at a time. "If Tibbles gets nanonibbled, Schrödinger won't help me with . . . YIKES!"

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Something marmalade-colored streaked past. It was Tibbles: several patches of his fur had been completely dissolved by the onslaught of nano-bites. The furious feline, formerly furry, shot through the spreading arch of Smedley's legs as if Tibbles were a croquet ball and Smedley the wicket. Smedley turned around just in time to see the cat leap between the half-open doors of Erwin Schrödinger's schrank.

"Get out of there, cat!" said Smedley. As he spoke, a rapid phalanx of tiny glittering objects moved past him with incredible speed. The nanobots, programmed to seek out dirt, were rushing pell-mell towards the single dirtiest object in the apartment: Schrödinger's cat. Tibbles was cowering inside the washbucket on the starboard side of the schrank, so the nanobots headed schrankwards. And since the nanobots moved very fast, Smedley would have to act quickly.

"I really hate it when this kind of thing happens," said Smedley, taking out a raygun that he'd received from his friend Doctor Cyclops at the last Evil Geniuses Convention. "Let's see: if I remember correctly, this raygun is supposed to shrink people . . . so I guess it should work on inanimate objects too, and if a cat isn't an inanimate object then I don't know what is. If I shrink Tibbles so that he's even smaller than the nanobots, then the nanobots won't be able to find him. But I don't know much about shrinking things: I'm a swindler, not a dwindler. What's the safest way to reduce the size of physical matter? I could shrink all of the cat's atoms proportionately, by compressing all the empty space between the cat's subatomic particles. But then the cat would attain the density of a neutron star, which wouldn't help the property values in this neighborhood."

"*Meeeyowww!*" screeched Tibbles from within the cabinet.

"Or I could shrink the cat by simply destroying most of its mass altogether, making sure that the surviving molecules retain their current ratio. No, that might work for the first few orders of magnitude, but eventually it would destroy the cat's cellular integrity."

"*Meeeeee-yowwwwww!*"

"Shut up, cat! I'm trying to figure out how to rescue you," said Smedley Faversham. "Oh, nano-nuts! I guess I'll have to do this the old-fashioned way. I'll shrink Tibbles by displacing ninety-nine percent of his atomic mass into an alternate spatial dimension, thus maintaining his cellular integrity while making him a whole bunch smaller in *this* Universe."

Smedley disengaged the safety pin on his raygun and fired a blast of energy into Schrödinger's wooden cabinet. Both doors had flown wide open during the cat's struggles, and Smedley aimed directly towards the cat as it fought off the nanobots. But Smedley had neglected to compensate for the raygun's recoil—this is exactly the sort of thing that never happens with fictional rayguns, but which happens constantly with real-life rayguns—and so his aim was askew. The bolt of energy struck an unintended target: not Tibbles the cat, but the two-door cabinet *containing* Tibbles.

The schrank shrank.

Smedley watched in horror as the double-doored cabinet dwindled in size, shrinking rapidly until it looked like a piece of dollhouse furniture, then shrinking even smaller. Smedley's nanotech algorithm had no instructions for this, so all the nanobots stopped dead in their tracks as their teeny-weeny circuit-breakers broke. Just as the still-shrinking cabinet became submicroscopic and vanished completely, Smedley heard a sound at the front door. He turned around to see Erwin Schrödinger setting down his valises.

"So! There you are!" said Schrödinger. "Why are the neighbors complaining about rotten sturgeon raining down from the sky, and upside-down sandstorms?"

"Those are peachy questions," said

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Smedley. "And now here's one for you: why are you home early? According to my history disks, you didn't return from your 1926 visit with Max Planck until July twentieth."

"This *is* July twentieth," said Erwin Schrödinger. "I've been gone for more than a week." Smedley checked his cummerbund, and saw that his antigravitons had been leaking all over the apartment and warping space-time.

"Whoops! Pardon my error," said Smedley Faversham. "I hadn't realized that Time is moving much faster outside this apartment than inside. That explains why the iceman standing on the doorstep looked so blurry. Guess I'd better fix the time-leak right now."

Erwin Schrödinger was inspecting his living room, and now he glared at Smedley. "*Wo ist mein Kabinett?* What have you done with my schrank?"

"The schrank? It shrunk," said Smedley, attempting to reverse the controls on his raygun and set them to Unshrink.

Now Schrödinger noticed that something else was missing. "And where is my wife's cat?"

"Tibbles? He's taken a cabinet position, as minister of the interior," said Smedley with increasing desperation, as he unstuck the controls on the raygun. Casually suspending Newton's Third Law so that this time he wouldn't have to compensate for the weapon's recoil, Smedley aimed his raygun at where the schrank had last stood before it became microscopic. "I've heard of rearranging the furniture, but this is ridiculous. Stand back!"

But just as Smedley Faversham activated his unshrinking ray, a thought occurred to him: when he had tried to shrink Tibbles, the cat had received only a small portion of the shrinking energy while the cabinet had received the major brunt of the blast.

Consequently, although both cat and cabinet had started dwindling at the same time, the cabinet had shrunk *more rapidly* than the animal inside it. Which meant that Tibbles must have experienced the unpleasant sensation of the cabinet's walls closing in around him on all sides as the cabinet grew smaller until . . .

. . . well, *ick*.

As this thought entered Smedley's brain, another thought drove up and double-parked alongside the first one. The cat *must* have survived the shrinking process, because the schrank could never become smaller than any object *inside* itself . . . at least, not without either damaging the boards of the cabinet, or crushing the bones and internal organs of Tibbles.

Now a tiny object appeared in the beam of the unshrinking ray, and rapidly grew larger until the fully-restored schrank was again in its place. The walls of the cabinet were undamaged, and there were no signs of cat-bloodstains or other feline mayhem.

Unfortunately, there were also no signs of Tibbles. The doors of the cabinet were closed, and no cat-sounds emerged from within. The usually loquacious Tibbles was unexpectedly silent. Had Schrödinger's cat been subatomically compressed into Tibble Kibble?

Smedley considered his options. He remembered an animal hospital in the twenty-third century that worked medical miracles. If Tibbles was injured, Smedley could contact the distant future and send for the purr-a-medics. Of course, the veterinarians in the twenty-third century weren't running a free boardinghouse for sick cats: the cost would be ten thousand credits a weak purr. Just as Smedley was thinking of this, something else happened.

The schrank stank.

A peculiar odor emerged from the cabinet, sharp and sour and unpleasant. Erwin Schrödinger convulsed. His eyes watering, he thrust his handkerchief over his nose and mouth as he rushed to a window and opened it, leaning far out so as not to inhale the sharp vapor. "*Ach!*" said Schrödinger. "What is that

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stink? It smells like . . . *Blausäure!*"

"Damned if I know," said Smedley helpfully, "but it hurts my olfactory bulbs, and it smells like some ol' factory." Smedley couldn't identify the odor; to find out what he was inhaling, he activated his search engine and consulted the smell-check. "*Get rid of that stuff FIRST, you schmuck*," proclaimed the readout on his smell-check, "*and THEN we'll tell you what it is*." Only after Smedley had redirected the vapor into his personal mini-black hole (which he kept handy at all times for just such emergencies as this) would the smell-check's diodes then disburse their data: "*Breathe easy, bub*," said the impolite readout. "*You've just escaped suffocation from hydrocyanic acid. Good thing the bottle was almost empty, or else you'd be doing less coughin' and more coffin. Have a nice day.*"

"Oops and double oops," said Smedley, now remembering that one of the drawers on the left side of the schrank had contained a chemist's bottle with a small residue of clear liquid. Evidently the glass bottle and its contents had failed to shrink as rapidly as the cabinet, and the bottle had been crushed.

Yes, but what about Tibbles? Smedley stepped towards the schrank, but Schrödinger's hand on his arm suddenly restrained him. "You still haven't answered my question," said Schrödinger. "*Wo ist der Kater?*"

Smedley's subtitle software must have been glitching, because Schrödinger's voice kept fluxing between Austrian-accented German and translated English. "Y-your cat?" Smedley stuttered, as he moved towards the cabinet. "Uh, your cat's had a shattering experience, and . . ."

"Did you do as I asked?" said Erwin Schrödinger menacingly, unslouching himself to his full height of five feet six inches.

"Who, me? Of course! I never argue with a future Nobel laureate," said Smedley.

"Because," Schrödinger went on without listening to Smedley, "when I entrusted you with my home's safekeeping, I specifically asked you to *take care of* my wife's cat. Naturally, since you and I are both men of the world, I saw no reason to speak more bluntly."

Something in the inflection of Schrödinger's voice prompted Smedley to activate the Rewind on his subtitle software and play back the scientist's original words, this time with the Euphemism option engaged. "Oh, now I get it," Smedley said to himself between the quantum increments of the time-stream, so that Schrödinger wouldn't overhear him. "When Professor Schrödinger told me to take care of his wife's cat, he really meant that I was supposed to *take care of* his wife's cat. Nudge, nudge, wink, wink. Little did I know that Schrödinger actually hates that mangy little critter—the cat, I mean: not his wife—and he was secretly hoping that I would kill Tibbles accidentally on purpose while Schrödinger and his wife were away. I had no idea that a Nobel prize-winning physicist could be so sneaky."

"So! Please tell me, then," said Erwin Schrödinger to Smedley now, with rising urgency. "Did you take care of the cat as I asked, or did you not?"

Smedley looked towards the silent cabinet, which contained either a Tibbles very much alive or a Tibbles not alive at all. The silence from within implied the latter scenario. "I'll take back that last 'oops'," Smedley said to himself outside the time-stream. "If Schrödinger really *wanted* me to kill his damned cat, I can take credit deliberately for what I did accidentally." Modulating the time-stream again so that Schrödinger could hear him now, Smedley cleared his throat and announced: "Herr Professor, it gives me great pleasure to inform you that Tibbles is . . ."

"No, let me tell you my good news first," said Schrödinger, his face assuming a beatific expression of marital bliss.

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"My darling wife Anny has come back to me! A little argument we had, over that cat of hers who smells so bad and scratches up the furniture. But now I see more clearly how Annemarie loves me in spite of all my faults, and so I should overlook a few cat problems. The cat makes my wife happy, and dearest Anny keeps *me* happy." Schrödinger's smile faded, as he regarded Smedley again. "Now tell me, please: what about the cat?"

"I would put back the 'oops' that I took back before, if I knew where to put it," Smedley said to himself, wondering what to do. Schrödinger and his wife were reconciled, but Smedley had no idea whether Erwin Schrödinger sincerely wanted Tibbles to be alive and well, or if Schrödinger was merely a devoted husband going through the motions of cat-tolerance for his wife's sake. If the latter were true, then Schrödinger would secretly rejoice at the news of the cat's death while pretending the opposite . . . and Smedley Faversham, as accidental agent of the cat's demise, would be in the physicist's good graces. On the other hand, if Schrödinger had sincerely ended his grudge against Tibbles, then there would be hell to pay when Schrödinger found out that Smedley Faversham had rendered the kitty *kaputt*. Did Schrödinger really prefer Tibbles to be alive, or dead? Tabby, or no tabby? *That* was the question. One possibility was the right one, another the wrong one, but Smedley had no idea which was which.

For that matter, *was* the cat alive? The doors of the cabinet remained closed. Now Smedley recalled that—when the vapors were released—the cat and the bottle of acid had been on opposite sides of the schrank, with the wooden partition between them acting as a partial buffer. The wooden drawer surrounding the shattered bottle, and the washbucket containing Tibbles, would have served as buffers too. There was a strong possibility that Tibbles had inhaled just enough of the fumes to be rendered merely unconscious rather than dead. But the silence from the *schranktum schranktorum* gave no clue to the health of its occupant. Was Tibbles at this moment in a cat-normal condition (i.e., unconscious), or had he encountered his doom? And if the cat were dead, or if the cat were alive, *which* result would be more likely to persuade Schrödinger to assist in the completion of Smedley Faversham's four-dimensional harmonic oscillator? Surely the optimum result would be whichever one made Erwin Schrödinger satisfied . . . yes, but *which?* Smedley only had to open the cabinet to learn the truth.

"Uh, your cat, did you say?" said Smedley feebly, while he reached towards the doorknobs of the schrank. "Well, as it happens, your cat is . . ."

Then, suddenly, Smedley Faversham saw the obvious.

"*That's it!*" he whooped. "The cat occupies a superposition between two distinct quantum states because we don't know its fate . . . but as soon as we open the door and find out, the wave function collapses into certainty! And if we apply that same principle to atomic decay, that explains the problem I've been having with my four-dimensional harmonic oscillator! Jumping Kallikaks! Why didn't I see it before?" Restraining an urge to kiss Schrödinger's forehead, Smedley settled for shaking the physicist's hand. "Thanks a lot, professor! You've been a big help! Well, I guess I'll be going . . ."

And with that cheery pronouncement, Smedley Faversham activated his wormhole and got the hell out of there. The last thing Smedley saw as he looked back over his shoulder towards the swiftly receding event horizon of 1926 was Erwin Schrödinger opening the doors of his cabinet and looking within to find . . .

". . . and that's the end of the story," said Smedley Faversham to Lepton,

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Klepton and Neutrina as he deactivated the flashback sequence and returned to their nursery. "Fortunately, all those nanobots that I left back in 1926 self-destructed automatically, and turned into polycarbonate sludge on Schrödinger's floor. I guess that Annemarie Schrödinger taught her husband to clean up his own mess for a change, because the history disks show that *Herr und Frau* Schrödinger had a long happy marriage after that one little tiff."

"But what about Schrödinger's cat?" asked Klepton.

"Funny you should ask," said Smedley Faversham. "After I did all the brainwork, Schrödinger went and told my cat-in-the-box paradox to some guy named Einstein as if he'd thought it up himself. Of course, he waited until 1933, but still . . ."

"No! What about *Tibbles?* " asked Neutrina, while Lepton and Klepton nodded. "Was the cat alive or dead?"

"Well, you see, little kiddiewinks," said Smedley, as he stealthily backed towards the exit. "The whole point of the story was that *you don't know* how it ends. Like the one about the Lady or the Tiger. Once upon a time there was a . . ."

"*Booo!* That's the dumbest story in the universe!" yelled Neutrina, while Lepton added: "*It stinks!* " All three brats reached into their box of toys for a supply of death-ray grenades, and started lobbing these at Smedley's head.

But Smedley was too fast for them. In a flash, he was out of the nursery and slamming the door shut behind himself before the death-ray grenades could reach him. As he paused to catch his breath and listen to the deadly grenades detonating on the far side of the door, Smedley was thankful that the nursery's radiation shielding would absorb most of the blast. (In Smedley's family, all the nurseries were equipped with radiation shielding.)

"Whew! I never thought I'd get away from those brats in one piece!" Smedley muttered, just as a very large wormhole materialized in front of him and a familiar figure stepped forth.

"*Smedley Faversham!* " said his Auntie Mater. "Why are you lollygagging like this, when I told you to stay with my weans?"

"Your weans, Auntie?" asked Smedley nervously. By now Lepton, Klepton and Neutrina had probably incinerated themselves in their own little beds from the heat-blast of their own death-ray grenades. Still, at least they had incinerated themselves in their own beds, at a reasonable bedtime, instead of staying out late in a pool-hall or something. "Why, the little darlings are in bed, of course," said Smedley sweetly.

Auntie Mater beamed maternally. "So they're asleep, then?"

"In a sense, yes." Smedley nodded, and then he recalled that—just before his flashback sequence—Neutrina's experiments with her maturon-transfer device had knocked a hole in the nursery's outer wall. There was a distinct possibility that one or more of Auntie Mater's brats had escaped through that hole *before* the death-ray grenades had detonated. And since there were *three* weans, and any *one* of them might have escaped from the blast . . . or any two of the three had survived, or all three of them, or none of them at all . . . there were now any or all of *eight* different quantum states of superposition lying in wait for Smedley Faversham, just beyond the nursery door.

"*Smedley!* " his Auntie Mater bellowed, interrupting his quantum reveries. "Did you hear what I said? I have asked you a question about Lepton, Klepton and Neutrina: are my precious little darlings *all right?* "

"Maybe yes, maybe no," said Smedley Faversham, as he put his hand on the doorknob leading to the nursery. "What say we take a look and *find out?* "■

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The Precipice, part III of IV

Ben Bova

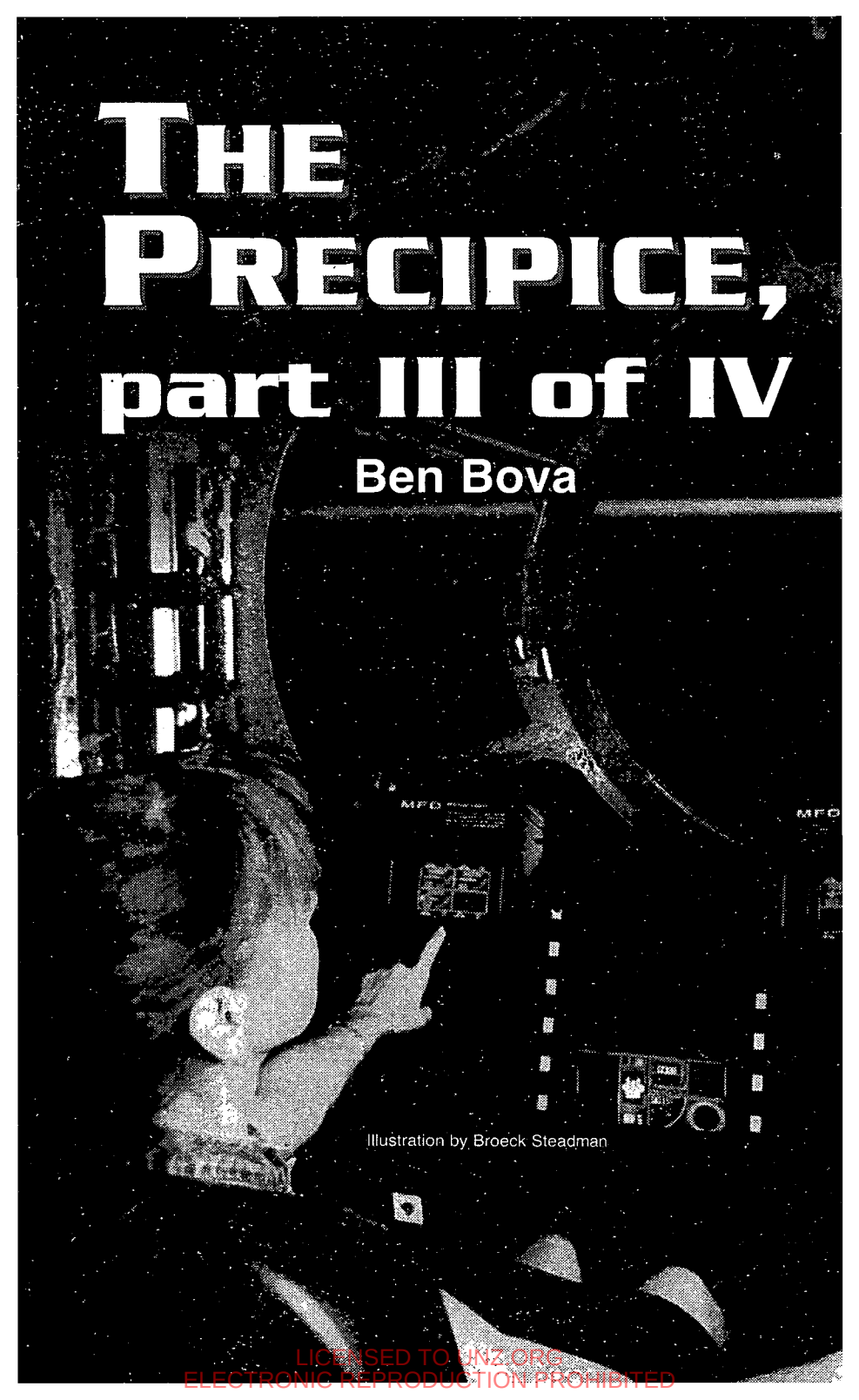

Illustration by Broeck Steadman

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Earth's climate has plunged over the Greenhouse Cliff. Sudden, disastrous warming has abruptly raised sea levels worldwide, flooded most coastal cities, and is turning croplands into deserts. Tens of millions are homeless; hundreds of millions face famine.

Dan Randolph, founder and CEO of Astro Manufacturing, Inc., wants to use the resources of the Asteroid Belt to help the battered, beleaguered people of Earth. But the costs of reaching the Belt, out beyond the orbit of Mars, doom his hopes to financial failure.

From his home in Selene, on the Moon, Martin Humphries sees Earth's catastrophe as an opportunity to gain wealth and power. He wants to acquire Dan Randolph's company, Astro Manufacturing, Inc. To lure Dan, Humphries offers to finance development of a fusion-powered space drive that will make it financially feasible—even profitable—to mine the rich resources of the Asteroid Belt. Devil-may-care pilot Pancho Lane is the sharpest astronaut on Astro's payroll. Humphries enlists her to spy on Randolph, who has assigned Pancho and the lusciously beautiful Amanda Cunningham to test-fly the first fusion-powered spacecraft. Pancho reluctantly agrees to spy for Humphries; she needs the money to support her sister, who is in cryonic suspension, waiting to be revived and cured of the cancer that led to her clinical death.

But Pancho finds she can't be disloyal to Dan Randolph. When she reveals to Dan that Humphries wants her to spy on him, Dan laughs and tells her to go right ahead. But he sends Pancho and Amanda to Selene.

To build the fusion drive, Dan turns to nanotechnology. Nobel laureate Kris Cardenas heads the nanotech lab at Selene. She is bitterly angry at the "nanoluddites" who have banned all nanotechnology from Earth, exiling her and anyone else who has used nanomachines in their bodies. Cardenas cannot return to Earth, and her children and grandchildren will not visit her on the Moon, for fear of being prevented from returning to Earth.

Meanwhile Pancho Lane sneaks into Martin Humphries' home while wearing a nanotech stealth suit that makes her invisible. The stealth suit was developed in Selene during the lunar community's brief and successful war of independence. It has been kept secret ever since. But Pancho "borrows" the "cloak of invisibility" and hacks into Humphries' files.

GRAND PLAZA

This is getting silly, Pancho thought. Humphries doesn't trust phones or electronic links—too easy to tap, he says. So we have to meet face-to-face, in person, but in places where we won't be noticed together. And he's running out of places.

He had stopped inviting Pancho to his home, down at the bottom level. Worried about somebody seeing her down there where she doesn't belong, he claimed. But Pancho knew he'd stopped inviting her down there once she'd introduced him to Mandy. So his house was now out.

Going outside on tourist jaunts is dumb, she thought. Besides, sooner or later some tourist is gonna recognize the high and mighty Martin Humphries on his bus. And how many times can an Astro employee take an afternoon off to go on a bus ride up on the surface? It's silly.

So now she was strolling along one of the paved paths that meandered through the Grand Plaza. Lots of grass and flowery shrubs and even some trees. Nothing as lush as Humphries had down at his grotto, but the Plaza was pleasant, relaxed, open and green.

For a town that's only got about three thousand permanent residents, Pancho thought, there's an awful lot of people up here sashaying around. The walking

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paths weren't exactly crowded, but there were plenty of people strolling along. Pancho could tell the Selene citizens from the rare tourists easily: the locals shuffled along easily in the low gravity and dressed casually in coveralls or running suits, for the most part; the few tourists she spotted wore splashy teeshirts and vacation shorts and hopped and stumbled awkwardly, despite their weighted boots. Some of the women had bought expensive frocks in the Plaza shops and were showing them off as they oh-so-carefully stepped along the winding paths.

The Selenites smiled and greeted each other as they passed; the tourists tended to be more guarded and uncertain of themselves. Funny, Pancho thought: anybody with enough money and free time to come up here for a vacation oughta be more relaxed.

The outdoor theater was jammed, Pancho saw. She remembered a news bulletin about Selene's dance club performing low-gravity ballet. All in all, it seemed a normal weekday evening in the Plaza, nothing out of the ordinary.

All the paths winding through the greenery led to the long windows set into the far end of the Plaza dome. Made of lunar glassteel, they were perfectly transparent yet had the structural strength of the reinforced concrete that made up the rest of the dome's structure. It was still daylight outside, and would be for another two hundred-some hours. A few tourists had stopped to gape out at the cracked, pockmarked floor of Alphonsus.

"It looks so *dead!* " said one of the women.

"And empty," her husband muttered.

"Makes you wonder why anyone ever came up here to live."

Pancho huffed impatiently. You try growing up in Lubbock, or getting flooded out in Houston, see how much better the Moon looks to you.

"Good evening," said Martin Humphries.

Pancho had not seen him approaching. She'd been looking through the windows at the outside, listening to the tourists' comments.

"Howdy," she said.

He was wearing dark slacks with a beige pullover shirt. And sandals, no less. His "ordinary guy" disguise, Pancho thought. She herself was in the same sky blue coveralls she'd been wearing all day, with an Astro Corporation logo over the left breast pocket and her name stencilled just above it.

Gesturing to a concrete bench at the edge of the path, Humphries said, "Let's sit down. There are no cameras out here to see us together."

They sat. A family strolled by, parents and two little boys, no more than four or five. Lunatics. Selenites. The kids might even have been born here, she thought.

"What have you been up to lately?" Humphries asked casually.

Truthfully, Pancho reported, "We've started the detailed mission planning. Randolph's picked out a couple of target asteroids for us to rendezvous with, and now Mandy and me are workin' out the optimum trajectory, trip times, supply needs, failure modes . . . stuff like that."

"Sounds boring."

"Not when your life hangs on it."

Humphries conceded the point with a nod. "The construction of the propulsion system is proceeding on schedule?"

"You'd know more about that than I would."

"It is," he said.

"That's what I figured. Dan'd go ballistic if there were any holdups there."

"Amanda refuses to see me," he said.

For a moment Pancho was jarred by the sudden change of subject. Recovering quickly, she replied, "Mandy's got enough on her hands. This isn't the time for her to get involved with somebody . . . anybody."

"I want her off the mission."

"You can't do that to her!" Pancho blurted.

"Why not?"

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"It'd ruin her career, that's why. Bounced off the first crewed mission to the Belt: how'd that look on her resumé?"

"She won't need a resumé. I'm going to marry her."

Pancho stared at him. He was serious.

"For how long?" she asked coldly.

Anger flared in Humphries' eyes. "Just because my first two marriages didn't work out, there's no reason to think this one won't."

"Yeah. Maybe."

"Besides," Humphries went on, "if it doesn't work out, she'll get a very handsome settlement out of me. She'll never have to work again."

Pancho said nothing. She was thinking, If it doesn't work out he'll use every lawyer he's got to throw Mandy out into the cold without a cent. If it doesn't work out he'll hate her just as much as he hates his first two wives.

"I want you to help convince her to marry me," Humphries said.

Pancho's mind was spinning. You gotta be careful here, she warned herself. Don't get him mad at you.

"Mr. Humphries, that's something I just plain can't do. This isn't a business deal, I can't talk her into doin' something she doesn't want to do. Nobody can. Except maybe you."

"But she won't see me!"

"I know, I know," she said, as sympathetically as she could. "It's just too much pressure for her, what with the mission and all."

"That's why I want her off the mission."

"Don't do that to her. Please."

"My mind's made up."

Pancho sighed unhappily. "Well, you're just gonna have to talk to Dan Randolph about that. He's the boss, not me."

"Then that's what I'll do," Humphries said firmly.

"I wish you wouldn't. Why don't you let us go out to the Belt? When we get back, Mandy'll be able to give you her full attention."

"No." Humphries shook his head. "You might not get back."

"We will."

"You might not. I don't want to take the chance of losing her."

Pancho looked into his eyes. They were still cold, unreadable, like the eyes of a professional card shark she'd known once, while she'd been supporting herself through the University of Nevada in Las Vegas by working at one of the casinos. Not the eyes of a lovesick swain. Not the eyes of a man whose heart might break.

"Better talk to Randolph, then," she said.

"I will."

Feeling weary and more than a little afraid of what was going to happen with Mandy, Pancho got to her feet. Humphries stood up, too, and she noticed that he was several centimeters shorter than she'd thought him to be. Glancing down at his sandals, she thought, The sumbitch must have lifts in his regular shoes.

"By the way," Humphries said, his voice hard-edged, "someone's hacked into my private files."

She was genuinely surprised that he'd found out so quickly. It must have shown on her face.

"Randolph is a lot smarter than I thought he was, but it won't do him any good."

"You mean he's the one who hacked you?"

"Who else? One of his people, obviously. I want you to find out who. And how."

"I can't do that!" Pancho blurted.

"Why not?"

"I'll get caught. I'm not a chip freak."

His eyes bored into her for a painfully long moment. "You find out who did it. And how it was done. Or else."

"Or else what?"

With a grim smile, Humphries answered, "I'll think of something."

* * *

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ASTRO CORPORATION OFFICES

"If he finds the account I set up for him to pay the rent on my sister's dewar I'm toast," Pancho said as she paced across Dan's office.

Sitting behind his desk, Dan said, "I'll get George to scratch the program. Astro can pay the storage fees for your sister."

Pancho shook her head. "That'll just call attention to what I did."

"Not if we erase the subroutine completely. He'll never know."

"No!" Pancho insisted. "Don't go anywhere near it. It'll tip him off for sure."

Dan could see how agitated she was. "You just want to leave it there? He might stumble across it any minute."

"He knows I did it," Pancho said, crossing the room again in her long-legged strides. "I know he knows. He's just playin' cat-and-mouse with me."

"I don't think so. He's not the type. Humphries is more a sledgehammer-on-the-head kind of guy."

She stopped and turned toward Dan, her face suddenly white, aghast. "Jesus H. Christ . . . he might turn off Sis's life support! He might pull the plug on her!"

Dan knew she was right. "Or threaten to."

"That'd give him enough leverage to get me to do whatever he wants."

"What does he want?"

"He wants Mandy. He wants her scrubbed from the mission so he can talk her into marrying him."

Dan leaned back in his desk chair and stared at the ceiling. He'd had the office swept for bugs only an hour earlier, yet he had the uneasy feeling that Humphries knew everything that he said or did. Pancho's not the only Astro employee he's recruited, Dan reminded himself. My whole double-damned staff must be honeycombed with his snoops. Who can I trust?

He snapped forward in the chair and said into the phone console, "Phone, find George Ambrose. I want him here, now."

In less than a minute Big George came through the doorway from the outer office.

"George, I want this whole suite swept for bugs," Dan commanded.

"Again? We just did it an hour ago."

"I want you to do it this time. Yourself. Nobody else."

Scratching at his shaggy beard, George said, "Gotcha, boss."

It took a maddening half hour. Pancho forced herself to sit on the sofa while George went through the office with a tiny black box in one massive paw.

"Clean in here," he said at last.

"OK," said Dan. "Close the door and sit down."

"You said you wanted the outer offices done, too," George objected.

"In a minute. Sit."

Obediently, George lowered his bulk into one of the cushioned chairs in front of Dan's desk.

"I've been thinking. Tonight, the three of us are going to move a dewar out of the catacombs," Dan said.

"Sis? Where—"

"I'll figure that out between now and then," Dan said. "Maybe somewhere else on the Moon. Maybe we'll move her to one of the space stations."

"You've gotta have the right equipment to maintain it," George pointed out.

Dan waved a hand in the air. "You need a cryostat to keep the nitrogen liquified. Not much else."

"Life-support monitors," Pancho pointed out.

"Self-contained on the dewar flask," said Dan.

"Not the equipment," Pancho corrected. "I mean you need some people to take a look every few days, make sure everything's running OK."

With a shake of his head, Dan said, "That's a frill that you pay extra for. You don't need it. The equipment has safety alarms built in. The only time you need human intervention is when the flask starts to exceed the limits you've set the equipment to keep."

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"Well, yeah . . . I guess," Pancho agreed reluctantly.

"OK, George," Dan said. "Go sweep the rest of the place. We can all meet here for dinner at . . ." he called up his appointment screen with the jab of a finger, ". . . nineteen-thirty."

"Dinner?" Pancho asked.

"Can't do dirty work on an empty stomach," Dan said, grinning mischievously.

"But where are we taking her?" Pancho asked as she disconnected the liquid nitrogen feed line. Despite its heavy insulation, the hose was stiff with a rime of frost. Cold white vapor hissed briefly from its open end, until she twisted the seal shut.

"Shh!" Dan hissed, pointing to the baleful red eye of the security camera hanging some fifty meters down the corridor.

This late at night they were quite alone in the catacombs, but Dan worried about that security camera. There was one at each end of the long row of dewars, and although the area was dimly lit, the cameras fed into Selene's security office where they were monitored twenty-four hours a day. Pancho figured that, like security guards anywhere, the men and women responsible for monitoring the cameras seldom paid them close attention, except when a warning light flashed red or a synthesized voice warned of trouble that some sensor had detected. That's why they had hacked into the sensor controls on Sis's dewar and cut them out of the monitoring loop.

Dan and George were sweating with the effort of jacking up the massive dewar onto a pair of trolleys. Even in the low gravity of the Moon, the big stainless steel cylinder was heavy.

"Where're we goin'?" Pancho repeated.

"You'll see," Dan grunted.

Pancho plugged the nitrogen hose into the portable cryostat they had taken from one of the Astro labs, several levels below the catacombs.

"OK, all set," she whispered.

"How're you doing, George?" Dan asked.

The shaggy Australian came around the front end of the dewar. "Ready whenever you are, boss."

Dan glanced once at the distant camera's red eye, then said, "Let's get rolling."

The caster wheels on the trolleys squeaked as the three of them pushed the dewar down the long, shadowy corridor.

"Don't the security cameras have a recording loop?" Pancho asked. "Once they see Sis's dewar is missing, they'll play it back and see us."

"That camera's going to show a nice, quiet night," Dan said, leaning hard against the big dewar as they trundled along. "Cost me a few bucks, but I think I found an honest security guard. She'll erase our images and run a loop from earlier in the evening to cover the erasure. Everything will look peaceful and calm."

"That's an honest guard?" Pancho asked.

"An honest guard," Dan said, panting with the strain of pushing, "is one who stays bought."

"And I'll put an empty dewar in your sister's place," George added, "soon's we get this one settled in." Pancho noticed he was breathing easily, hardly exerting himself.

"But where're we takin' her?" Pancho asked again. "And why're we whisperin' if you got the guard bought?"

"We're whispering because there might be other people in the catacombs," Dan replied, sounding a bit irked. "No sense taking any chances we don't need to take."

"Oh." That made sense. But it still didn't tell her where in the hell they were going.

They passed the end of the catacombs and kept on going along the long, dimly-

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lit corridor until they stopped at last at what looked like an airlock hatch.

Dan stood up straight and stretched his arms overhead until Pancho heard his vertebrae crack.

"I'm getting too old for this kind of thing," he muttered as he went to the hatch and pecked on its electronic lock. The hatch popped slightly open; Pancho caught a whiff of stale, dusty air that sighed from it.

George pulled the hatch all the way open.

"OK, down the tunnel we go," said Dan, unclipping a flashlight from the tool loop on the leg of his coveralls.

The tunnel had been started, he explained to Pancho, back in the early days of Moonbase, when Earthbound managers had decided to ram a tunnel through the ringwall mountains to connect the floor of Alphonsus with the broad expanse of Mare Nubium.

"I helped to dig it," Dan said, with pride in his voice. Then he added, "What there is of it, at least."

The lunar rock had turned out to be much tougher than expected; the costs of digging the tunnel, even with plasma torches, had risen too far. So the tunnel was never finished. Instead, a cable-car system had been built over the mountains. It was more expensive to operate than a tunnel would have been but far cheaper to construct.

"I've ridden the cable car up to the top of Mt. Yeager," Pancho said. "The view's terrific."

"Yep," Dan agreed. "They forgot about the tunnel. But it's still here, even though nobody uses it. And so are the access shafts."

The access shafts had been drilled upward to the outside, on the side of the mountain. The first of the access shafts opened into an emergency shelter where there were pressure suits and spare oxygen bottles, in case the cable-car system overhead broke down.

"And here we are," Dan said.

In the scant light from the flashlights that Dan and George played around the tunnel walls, Pancho saw a set of metal rungs leading up to another hatch.

"There's a tempo just above us," he said as George started climbing the ladder. "We'll jack into its electrical power supply to run the dewar's cryostat."

"Won't that show up on the grid monitors?" Pancho asked.

Shaking his head, Dan relied, "Nope. The tempos have their own solar panels and batteries. Completely independent. The panels are even up on poles to keep 'em out of the dust."

Pancho heard the hatch groan open. Looking up, she saw George squeeze his bulk through its narrow diameter.

"How're we gonna get Sis's dewar through that hatch?" she demanded.

"There's a bigger hatch for equipment," Dan said.

As if to prove the point, a far wider hatch squealed open over their heads. Dim auxiliary lighting from the tempo filtered down to them.

Even with the little winch from the tempo, it was a struggle to wrestle the bulky dewar and its equipment up through the hatch. Pancho worried that Sis would be jostled and crumpled in her liquid nitrogen bath. But at last they had Sis hooked up in the temporary shelter. The dewar rested on the floor and all the gauges were in the green.

"You'll have to come back here once a month or so to check up on everything. Maybe once every six or seven months you'll have to top off the nitrogen supply."

A thought struck her. "What about when I'm on the mission?"

"I'll do it," George said without hesitation. "Be glad to."

"How the hell can I thank you guys?"

Dan chuckled softly. "I'm just making certain that my best pilot isn't blackmailed by Humphries into working against me. And George . . ."

The big Aussie looked suddenly embarrassed.

"I used to live in one of the tempos,"

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he said, his tenor voice softer than usual. "Back when I was a fugitive, part of the underground. Back before Dan took me under 'is wing."

Dan said, "This is a sort of homecoming for George."

"Yeah," George said. "Reminds me of the bad old days. Almost brings a fookin' tear to my eye."

Dan laughed and the Aussie laughed with him. Pancho just stood there, feeling enormously grateful to them both.

STARPOWER, LTD.

Dan had offered space in Astro Corporation's office complex for the headquarters of the fledgling Starpower, Ltd. Humphries had countered with an offer of a suite in his own Humphries Space Systems offices. Stavenger suggested a compromise, and Starpower's meager offices opened in the other tower on the Grand Plaza, where Selene's governmental departments were housed.

Yet Stavenger had not been invited to this working meeting. Dan sat on one side of the small conference table, Martin Humphries on the other. The room's windowless walls were bare, the furniture strictly functional.

"I hear you've been having some problems with hackers," Dan said.

For just a flash of a second Martin Humphries looked startled. He quickly regained his composure.

"Whoever told you that?" he asked calmly.

Dan smiled knowingly. "Not much happens around here without the grapevine getting wind of it."

Humphries leaned back in his chair. Dan noticed that it was a personally-fitted recliner, unlike the other chairs around the table, which were inexpensive padded plastic.

"The leak's been fixed," Humphries said. "No damage done."

"That's good," said Dan.

"Speaking of the grapevine," Humphries said lightly, "I heard a funny one just this morning."

"Oh?"

"There's a story going around that you and a couple of your employees stole a dewar from the catacombs last night."

"Really?"

"Sounds like something out an old horror flick."

"Imagine that," Dan said.

"Curious. Why would you do something like that?"

Trying to find a comfortable position on his chair, Dan replied, "Let's not spend the morning chasing rumors. We're here to set our budget requirements."

Humphries nodded. "I'll get one of my people to track it down."

Or one of *my* people, Dan grumbled to himself. But it'll be OK as long as he can't find Pancho's sister. Only she and George and I know where we stashed her.

He said to Humphries, "OK, you do that. Now about the budget . . ."

They spent the next hour going over every item in the budget that Humphries' staff had prepared for Starpower, Ltd. Dan saw that there were no frills: no allocations for publicity or travel or anything except building the fusion drive, testing it enough to meet the IAA's requirements for human rating, and then flying it with a crew of four to the Asteroid Belt.

"I've been thinking that it makes more sense to up the crew to six," Dan said.

Humphries' brows rose. "Six? Why do we need two extra people?"

"We've got two pilots, a propulsion engineer, and a geologist. Two geologists would be better . . . or a geologist and some other specialist, maybe a geochemist."

"That makes five," Humphries said warily.

"I want to keep an extra slot open. Design the mission for six. As we get closer to the launch, we'll probably find out we need another hand."

Suspicion showed clearly in Humphries' face. "Adding two more

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people means extra supplies, extra mass."

"We can accommodate it. The fusion system's got plenty of power."

"Extra cost, too."

"A slight increment," Dan said easily. "Down in the noise."

Humphries looked unconvinced, but instead of arguing he asked, "Have you picked a specific asteroid yet?"

Dan tapped at his handheld computer and the wall screen that covered one entire side of the conference room displayed a chart of the Belt. Thousands of thin ellipsoidal lines representing orbital paths filled the screen.

"It looks like the scrawling that a bunch of kindergarten brats would make," Humphries muttered.

"Sort of," said Dan. "There's a lot of rocks moving around out there."

He tapped at the handheld again and the lines winked out, leaving the screen deep black with tiny pinpoints of lights glittering here and there.

"This is what it really looks like," Dan said. "A whole lot of emptiness with a few pebbles floating around here and there."

"Some of those pebbles are kilometers across," Humphries said.

"Yep," Dan replied. "The biggest one is—"

"Ceres. Discovered by a priest on New Year's Day, 1801."

"You've been doing your homework," Dan said.

Humphries smiled, pleased. "It's a little over a thousand kilometers across."

"If that one ever hit the Earth . . ."

"Goodbye to everything. Like the impact that wiped out the dinosaurs."

"That's just what they need down there," Dan muttered, "an extinction-level impact."

"Let's get back to work," Humphries said crisply. "There's no big rock heading Earth's way."

"None has been found," Dan corrected. "Yet."

"You know," Humphries said, musing, "if we were really smart we'd run a demo flight to Mars and do a little prospecting on those two little moons. They're captured asteroids, after all."

"The IAA has ruled the whole Mars system off-limits for commercial development. That includes Deimos and Phobos."

Hunching closer to the conference table, Humphries said, "But we could just do it as a scientific mission. You know, send a couple geologists to chip off some rock samples, analyze what they're really made of."

"They already have pretty good data on that," Dan pointed out.

"But it could show potential investors that the fusion drive works and there's plenty of natural resources in the asteroids."

Frowning, Dan said, "Even if we could get the IAA to allow us to do it—"

"I can," Humphries said confidently.

"Even so, people have been going to Mars for years now. Decades. Investors won't be impressed by a Mars flight."

"Even if our fusion buggy gets there over a weekend?"

Firmly, Dan said, "We've got to get to the Belt. That's what will impress investors. Show them that the fusion drive changes the economic picture."

"I suppose," Humphries said reluctantly.

"And we've got to lay our hands on a metallic asteroid, one of the nickel-iron type. That's where the heavy metals are, the stuff you can't get from the Moon or even the NEAs."

"Gold," Humphries said, brightening. "Silver and platinum. Do you have any idea of what this is going to do to the precious metals market?"

Dan blinked at him. I'm trying to move the Earth's industrial base into space and he's playing games with the prices for gold. We just don't think the same way; we don't have the same goals or the same values, even.

Grinning slyly, Humphries said, "We could get a lot of capital from people

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who'd be willing to pay us *not* to bring those metals to Earth."

"Maybe," Dan admitted.

"I know at least three heads of governments who would personally buy into Starpower just to keep us from dumping precious metals onto the market."

"And I'll bet," Dan growled, "that those governments rule nations where the people are poor, starving, and sinking lower every year."

Humphries shrugged. "We're not going to solve all the world's problems, Dan."

"We ought to at least try."

"That's the difference between us," Humphries said, jabbing a finger in Dan's direction. "You want to be a savior. All I want is to make a little money."

Dan looked at him for a long, silent moment. He's right, Dan thought. Once upon a time all I was interested in was making money. And now I don't give a damn. Not anymore. None of it makes any sense to me. Since Jane died—god, I've turned into a do-gooder!

Leaning forward again, toward Dan, his expression suddenly intense, earnest, Humphries said, "Listen to me, Dan. There's nothing wrong with wanting to make money. You can't save the world. Nobody can. The best thing we can do is to feather our own nests and—"

"I've got to try," Dan interrupted. "I can't sit here and just let them drown or starve or sink into another dark age."

"OK, OK." Humphries raised both hands placatingly. "You go right ahead and beat your head against that wall, if you want to. Maybe the asteroids are the answer. Maybe you'll save the world, one way or the other. In the meantime, we can clean up a tidy little profit doing it."

"Yep."

"If we don't make a profit, Dan, we can't do anybody any good. We've got to make money out of this or go out of business. You know that. We can't do this mission at cost. We've got to show a profit."

"Or at least," Dan countered, "a profit potential."

Humphries considered the idea for a moment, then agreed, "A profit potential. OK, I'll settle for that. We need to show the financial community—"

"What's left of it."

Humphries actually laughed. "Oh, don't worry about the financial community. Men like my father will always be all right, no matter what happens. Even if the whole world drowns, they'll sit on a mountaintop somewhere, fat and happy, and wait for the waters to go down."

Dan could barely hide his disgust. "Come on, let's get back to work. We've had enough philosophy for one morning."

Humphries agreed with a smile and a nod.

Hours later, after Dan had left the conference room, Humphries went back to his own office and sank into his high-backed swivel chair. As he leaned back and gazed up at the panelled ceiling, the chair adjusted its contours to accommodate his body. Humphries relaxed, smiling broadly. He missed it, he said to himself. The numbers are right there in the budget and Randolph went past them as if they were written in invisible ink.

It was so easy to distract Randolph's attention. Just get him started on his idiotic crusade. He blanks out to everything else. He wants to go to the Belt to save the world. Sounds like Columbus wanting to reach China by sailing in the wrong direction.

Humphries laughed out loud. It's right there in the budget and he paid no attention to it at all. Or maybe he thinks it's just a backup, a redundancy measure. After all, it's not a terribly large sum. Once the nanos have built one fusion system, it only costs peanuts to have them build another one. The real expense is in the design and programming, and that's all amortized on the first model. All the backup costs is the raw

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materials and the time of a few people to monitor the process. The nanos work for nothing.

He laughed again. Randolph thinks he's so fricking smart, sneaking Pancho's sister out of the catacombs. Afraid I'll terminate her? Or does he want to keep Pancho under his thumb? I won't be able to use her anymore, but so what, who needs her now? I'll be building a second fusion drive and he doesn't even know it!

SPACEPORT ARMSTRONG

Pancho stared across the desolate, blast-scarred expanse of the launch center and wrinkled her nose unhappily. "It sure looks like a kludge."

Standing beside her in the little observation bubble, Dan had to agree. The fusion drive looked like the work of a drunken plumber: bulbous spheres of diamond that sparkled in the harsh unfiltered sunlight drenching the lunar surface, the odd shapes of the MHD channel, the pumps that fed the fuel to the reactor chamber, radiator panels and the multiple rocket nozzles, all connected by a surrealistic maze of pipes and conduits. The entire contraption was mounted on the platformlike deck of an ungainly, spraddle-legged booster that stood squat and silent on the circular launch pad of smoothed lunar concrete.

The observation chamber was nothing more than a bubble of glassteel on the barren floor of Alphonsus' giant ringwall. Barely big enough for two people to stand in, the chamber was connected by a tunnel to the control center of the launch complex.

"We didn't build her for beauty," Dan said. "Besides, she'll look better once we've mated her with the other modules."

Subdued voices crackled from the intercom speaker set into the smoothed wall of the chamber just below the rim of the transparent blister.

"Pan Asia oh-one-niner on final descent," said the pilot of an incoming shuttle.

"We have you on final, oh-one-niner," answered the calm female voice of a flight controller. "Pad four."

"Pad four, copy."

Dan looked up into the star-flecked sky and saw a fleeting glint of light.

"Retrorockets," Pancho muttered.

"On the curve," said the flight controller.

Another quick burst. Dan could make out the shuttle now, a dark angular shape falling slowly out of the sky, slim landing legs extended.

"Down the pipe, oh-one-niner," said the woman controller. She sounded almost bored.

It all seemed to be happening in slow motion. Dan watched the shuttle come down and settle on the pad farthest away from the one on which the fusion rocket was sitting, waiting for clearance to take off. The shuttle pilot announced, "Oh-one-niner is down. All thrusters off."

Pancho let out a puff of pent-up breath.

Surprised, Dan asked, "White knuckles? You?"

She grinned, embarrassed. "I always get torqued up, unless I'm driving the buggy."

Glancing at his wristwatch, Dan said, "Well, we ought to get clearance to launch as soon as they offload the shuttle."

With a nod, Pancho said, "I'd better get suited up."

"Right," said Dan.

The fusion system itself was the last part of their spacecraft to be launched into orbit around the Moon. The propellant tanks and the crew and logistics modules were already circling a hundred kilometers overhead. Pancho would supervise the assembly robots that would link all the pieces together.

Dan went with her along the tunnel and into the locker room where the astronauts donned their spacesuits. Amanda was already there, ready to help

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check her out. Dan realized it had been a long time since he'd checked out anyone or donned a spacesuit himself. Spaceflight is so routine nowadays that you can come and go from the Earth to the Moon just like you ride a plane or a bus, he thought. But another voice in his head said, You're too old to be working in space. Over the years you've taken as big a radiation dose as you're allowed . . . and then some.

He felt old and pretty useless as he watched Pancho worm into the spacesuit while Amanda hovered beside her, checking the seals and connections. Like Pancho, Amanda was wearing light tan flight coveralls. Dan noticed how nicely she filled them out.

Well, he sighed to himself, at least you're not too old to appreciate a good-looking woman.

But he turned and headed for the tunnel that connected the spaceport to Selene proper, feeling useless, wondering if Humphries was right and he was butting his head against a stone wall.

As he started down the corridor that led to the connector tunnel he saw Doug Stavenger coming up in the other direction, looking youthful and energetic and purposeful.

Dammitall, he thought, Stavenger's older than I am and he looks like a kid. Maybe I ought to get some nanotherapy.

"Going to watch the launch?" Stavenger asked brightly.

"Think I'll go to the launch center and watch it from there."

"I like to watch from the observation bubble."

"I was just there," Dan said.

"Come on, let's see the real thing instead of watching it on a screen."

Stavenger's enthusiasm was contagious. Dan found himself striding along the narrow tunnel again, out to the bubble.

They ducked through the open hatch and into the cramped chamber. Stavenger climbed the two steps and looked out, grinning. Dan squeezed in beside him, nearly bumping his head on the curving glassteel.

"I used to sneak out here when I was a kid to watch the liftoffs and landings," Stavenger said, grinning. "I still get a kick out of it."

Dan made a polite mumble.

"I mean, we spend almost our whole lives indoors, underground," Stavenger went on. "It's good to see the outside now and then."

"As long as the glass doesn't crack."

"That's what the safety hatches are for."

Dan said, "But you've got to get through them fast, before they shut themselves."

Stavenger laughed. "True enough."

They stood shoulder-to-shoulder in the cramped blister, listening to the flight controllers' crisp voices clicking off the countdown. Stavenger seemed as excited as a kid; Dan envied him. A little tractor rolled noiselessly across the crater floor to the launch pad. Pancho's spacesuited figure jumped from it in dreamlike lunar slow-motion, stirring up lazy clouds of gray dust. Then she climbed up the ladder and sealed herself into the booster's one-person crew module.

"This is just an assembly mission, isn't it?" Stavenger asked.

"Right," said Dan. "She's not a pilot on this flight, just babysitting the robots."

Strangely enough, Dan felt his palms going clammy as the countdown neared its final moments. Relax, he told himself silently. There's nothing to this.

Still, his heart began to thump faster.

". . . three . . . two . . . one . . . ignition," said the automated countdown voice.

The spacecraft leaped off the launch pad in a cloud of smoke and gritty dust that evaporated almost as soon as it formed. One instant the craft was sitting on the concrete, the next it was gone.

"We have liftoff," said one of the human controllers in the time-honored tradition. "All systems in the green."

Pancho's voice came through the

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speaker. "Copy all systems green. Orbital insertion burn in ten seconds."

It was all quite routine. Still, Dan didn't relax until Pancho announced, "On the money, guys! I'm cruisin' along with the other modules. Time to go to work."

A controller's voice replied, "Rendezvous complete. Initiate assembly procedure."

Dan huffed. "She sounds more like a robot than a human being."

Just then the controller added, "OK, Pancho. I'll see you at the Pelican tomorrow night."

Stavenger grinned at Dan. "Maybe she drinks lubricating oil."

They walked through the corridor to the tunnel that led back to Selene. As they climbed onto one of the automated carts that plied the kilometer-long tunnel Stavenger asked, "How soon will you be ready for your flight to the Belt?"

"We've programmed a month of uncrewed flight tests and demo flights for IAA certification. Once we get the nod from the bureaucrats we'll be ready to go."

"Could your craft reach Jupiter?"

Surprised at the question, Dan replied, "In theory. But we won't be carrying enough propellant or supplies for that. Jupiter's almost twice as far as the Belt."

"I know," Stavenger murmured.

"Why do you ask?"

Stavenger hesitated. The cart trundled along the blank-walled tunnel smoothly, almost silently, its electrical motor purring softly. At last Stavenger answered, "Sooner or later we're going to have to go to Jupiter . . . or maybe one of the other gas giants."

Dan saw where he was heading. "Fusion fuels."

"Jupiter's atmosphere is rich in hydrogen and helium isotopes."

"Kris Cardenas mentioned that to me," Dan remembered.

"She and I have been talking about it. Fusion fuels could be a major trade commodity for Selene. And very profitable for Starpower, Ltd."

"Mining asteroids is a lot easier than scooping gases from Jupiter's atmosphere."

"Yes," Stavenger admitted, "but your idea of moving large segments of Earth's industry off the planet is only part of the solution to the greenhouse warming, Dan."

"I know, but it's a big part."

"The other half is to wean them off fossil-fuel burning. They've got to stop pumping greenhouse gases into the atmosphere if they're going to have any chance of stopping the global warming."

"And fusion is a way to do that," Dan muttered.

"It's the only way," Stavenger said firmly. "Your solar power satellites can provide only a small fraction of the energy that Earth needs. Fusion can take over the entire load."

"If we can bring in enough helium-three."

"There are other fusion processes that could be even more efficient than burning deuterium with helium-three. But they all depend on isotopes that are vanishingly rare on Earth."

"But plentiful on Jupiter," Dan said.

"That's right."

Dan nodded, thinking, He's right. Fusion could be the answer. If we could replace all the fossil-fueled electricity generating plants on Earth with fusion plants we could cut down the greenhouse emissions to almost nothing. Fusion power plants could generate the electricity for electric cars. That'd eliminate another big greenhouse source.

He looked at Stavenger with new respect. Here's a man who's exiled from Earth, yet he wants to help them. And he sees farther than I do.

"OK," he said. "After the flight to the Belt, we make a run out to Jupiter. I'll start the planning process right away."

"Good," said Stavenger. Then he added, "Will this be a Starpower project or will you keep it for Astro Corpora-

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tion?"

For a moment Dan was dumbstruck. When he found his voice, it was a shocked whisper. "You want to cut out Humphries?"

"He's maneuvering to get a stranglehold on asteroidal resources," Stavenger said, as cold as steel. "I don't think it would be wise to let him control fusion fuels, as well."

By all the gods that ever were, Dan thought, this guy is ready to go to war with Humphries.

BOARD MEETING

The filters in his nostrils were giving Dan a headache; they felt as big as shotgun shells. He had come back to Earth reluctantly for this quarterly meeting of his board of directors. Dan always felt he could run Astro Manufacturing just fine if the double-damned board would simply stay out of his way. But they always had to poke their noses into the corporation's operations, complaining about this, asking about that, insisting that he follow every crack-brained suggestion they came up with.

It was all so unnecessary. Dan held a controlling interest of the corporation's outstanding stock; not an absolute majority of the shares, but enough to outvote the other board members if he had to. The board could not throw him out of his seat as corporate president and chief executive officer. All they could do was nibble away, waste his time, drive up his blood pressure.

To top it off, now Martin Humphries had joined the board, smiling, making friends, chatting up the other members as they milled around the sideboard scarfing up drinks and tea sandwiches before sitting in their places at the long conference table. Humphries was out to get an absolute majority, that was as clear to Dan as a gun aimed at his head.

Through the sweeping window that ran the length of the board room Dan could see the surging waters of the Caribbean sparkling in the morning sun. The sea looked calm, yet Dan knew it was inching ever higher, encroaching on the land, patiently, inexorably. Humphries kept his back to the window, deep in intense discussion with a trio of elderly directors.

Dan had flown back to La Guaira specifically for this meeting. He could have stayed in Selene and chaired the meeting electronically, but that three-second lag would have driven him crazy. He appreciated how Kris Cardenas felt, dealing from the Moon every day with Duncan and his team in Scotland.

Dan stood at one end of the sideboard, beneath the big framed photograph of Astro's first solar power satellite, glinting in the harsh sunlight of space against the deep black background of infinity. He sipped on his usual aperitif glass of Amontillado, speaking as pleasantly as he could manage with the people closest to him. Fourteen men and women, most of the men either gray or bald, most of the women looking youthful, thanks to rejuvenation treatments. Funny, he thought: the women are taking rejuve therapy but the men are holding back from it. I am myself, he realized. The ultimate machismo stupidity. What's wrong with delaying your physical deterioration? It's not like a facelift; you actually reverse the aging of your body's cells.

"Dan, could I speak to you for a moment?" asked Harriett O'Banian. She'd been on the board for more than ten years, ever since Dan had bought out her small solar-cell production company.

"Sure, Hattie," he said, walking her slowly to the far corner of the big conference room. "What's on your mind?"

Hattie O'Banian was a trim-looking redhead who had consummated her buyout by Astro Manufacturing with a month-long affair with Dan. It had been fun for them both, and she'd been adult enough to walk away from it once she realized that no matter who shared his bed, Dan Randolph was in love with former President Jane Scanwell.

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Glancing over her shoulder to make certain no one was within eavesdropping range, O'Banian half-whispered, "I've been offered a damned good price for my Astro shares. So have half a dozen other board members."

Dan's eyes flicked to Humphries, at the other end of the room, still chatting with the directors gathered around him.

"Who made the offer?" he asked.

"A straw man. Humphries is the real buyer."

"I figured."

"The trouble is, Dan, that's it's a damned good offer. Five points above the market price."

"He's gone up to five, has he?" Dan muttered.

"With the stock in free-fall the way it is, the offer is awfully tempting."

"Yep, I can see that."

She looked up at him and Dan realized that her emerald green eyes, which could be so full of delight and mischief, were dead serious now.

"He can buy up enough stock to outvote you," O'Banian said.

"That's what he's trying to do, all right."

"Dan, unless you're going to pull some rabbit out of your hat at the meeting today, half your board is going to cash out."

Dan tried to grin. It came out more as a grimace. "Thanks for the warning, Hattie. I'll see what kind of rabbits I've got for you."

"Good luck, Dan."

He went to the head of the conference table, tapped the computer stylus against the stainless-steel water tumbler there, and called the meeting to order. The directors took their seats; before he sat down, Humphries complained of the glare from the window and asked that the curtains be closed.

The agenda was brief. The treasurer's report was gloomy. Income from the company's final solar power satellite construction project was tailing off as the project neared completion.

"What about the bonus for finishing the job ahead of schedule?" asked a florid-faced graybeard. Dan thought of him as Santa Claus with hypertension.

"That won't be paid until the sunsat is beaming power to the ground," said the treasurer.

"Still, it's a sizeable amount of money."

"It'll keep us afloat for several months," Dan said, waving the treasurer to silence.

"Then what?"

"Then we have to live off the income from existing operations. We have no new construction projects."

"That's the last of the power satellites?" asked the board member that Dan had privately nicknamed Bug Eyes. His eyes were even wider than usual, as if this was the first time he'd heard the bad news.

Dan clasped his hands as he answered carefully, "Although there are several orbital slots still available to accommodate solar power satellites, the GEC refuses to authorize any new construction."

"It's those damned Chinese," growled one of the older men.

"China is not alone in this," said a plump oriental woman sitting halfway down the table. Dan's name for her was Mama-San. "Many nations prefer to build power stations on their own ground rather than buy electrical power from space."

"Even though the price for that electricity is more than twice as high as our price," Dan pointed out. "And even higher, if you count the costs of sequestering their greenhouse gas emissions."

"Their governments subsidize the greenhouse amelioration," the treasurer pointed out.

"The people still have to pay for it, one way or another."

"What about beaming power from the Moon?"

"You wouldn't need the GEC to allocate any orbital slots for that, by god!" Santa Claus thumped the table with his

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fist.

"It's a possibility," Dan admitted, "and we've talked about it with the officials of Selene—"

"Selene doesn't own the whole damned Moon! Go off and build solar energy farms in the Ocean of Storms. Cover the whole expanse with solar cells, for god's sake!"

"We've looked into it," Dan said.

"And?"

"The problem is that no matter where the electricity is generated, it's got to be beamed to the ground here on Earth."

"We know that!"

Holding on to his temper, Dan went on, "The Pan-Asia bloc doesn't want to import energy, whether it comes from orbit or the Moon or the Lesser Magellanic Cloud. They won't allow us to build receiving stations on their territory. The Europeans have gone along with them and, between the two blocs, they have the GEC all wrapped up."

"How can we generate electricity from the Lesser Magellanic Cloud?" asked Bug Eyes. "That's quite a long distance away, isn't it?"

Give me strength, Dan prayed silently.

He got them through the various departmental reports at last, fielding what seemed like seventeen thousand questions and suggestions—most of them pointless, several absolutely inane—and went on to new business.

"At least here I have something positive to report," Dan said, smiling genuinely. "Our prototype fusion drive has been assembled in lunar orbit and test-flown successfully."

"You are ready to go to the Asteroid Belt?" asked Mama-San.

"As soon as we get the required crew-rating from the IAA."

From the far end of the table, Humphries spoke up. "We should have IAA approval in two to three weeks, barring any unforeseen setbacks."

"Setbacks?"

"An accident," Humphries said lightly. "Failure of the equipment, that sort of thing."

Or an IAA inspector on the take, Dan added silently. It happened only rarely, but it happened.

"How much is this mission to the asteroids costing us?" asked the sprightly, dapper Swiss gentleman whom Dan had dubbed The Banker.

"The mission is being fully funded by Starpower, Limited," Dan replied.

"Astro owns one-third of Starpower," Humphries pointed out.

"And you own the rest?" The Banker asked.

"No, Humphries Space Systems owns a third, and the other third is owned by Selene."

"How can a city own part of a corporation?"

"All the details are in the reports before you," Dan said, tapping his stylus against the computer screen built into the tabletop.

"Yes, but—"

"I'll explain it after the meeting," Humphries said, full of graciousness.

The Banker nodded but still looked unsatisfied.

"The point is," Dan told them, "that once this flight to the Asteroid Belt is accomplished, Astro's stock is going to rise. We'll have taken the first step in opening up a resource base that's enormous—far bigger than all the mining operations on Earth."

"I can see that Starpower's stock will go up," Santa Claus challenged.

"Astro's will, too," Dan said. "Because we have the corner on building the fusion engines."

"Not Humphries Space Systems?" They all turned to Humphries.

He smiled gently, knowingly. "No, this is going to be Astro's product. My corporation is merely supplying the capital, the funding."

Dan thought that Humphries looked like a cat eyeing a helpless canary.

SELENE

"So there you have it," Dan said to the

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IAA inspector. "The system performs as designed."

They were sitting in Starpower, Ltd.'s one and only conference room, a tiny cubicle with an oval table that felt crowded with only five people sitting around it. The display screens on all four smartwalls showed data from the test flights of the fusion drive. The first half dozen flights had been run remotely from the control center underground in Armstrong spaceport. The second string of six flights had been piloted by Pancho and Amanda.

Pointing to the screens, Dan said, "We've demonstrated acceleration, thrust, specific impulse, controllability, shutdown and restart . . . every facet of the full test envelope."

The inspector nodded solemnly. He was a young man with Nordic fair skin and pale eyes, dressed rather somberly in a plain gray pullover shirt and darker slacks. His hair was a thick dirty-blond mop that he wore long, almost down to his shoulders. Despite his conservative outfit, though, he had several gold rings on his fingers, a gold bracelet on his right wrist, and a gold chain around his neck. There was a pendant of some sort hanging from the chain but most of it was hidden beneath his shirt.

Pancho and Amanda sat flanking Dan, Humphries was on the other side of the small oval table, next to the inspector. For several long moments there was silence in the conference room. Dan could hear the background hum of the electrical equipment and the soft breath of the air circulation fans.

At last, Dan asked, "Well, what do you think, Mr. Greenleaf?"

"Dr. Greenleaf," the IAA inspector replied. "I have a doctorate in sociology."

Dan felt his brows hike up. Why would the IAA send a sociologist to check out a new spacecraft propulsion system? And why this particular little prig of a sociologist?

Greenleaf steepled his fingers in front of him. "You're surprised that a sociologist is evaluating your test data?"

"Well . . . yes, actually I am," Dan said, feeling decidedly uncomfortable.

"I can assure you, Mr. Randolph—"

"Dan."

"I can assure you, Mr. Randolph, that your data has been examined by the best engineers and physical scientists that the IAA has at its command." Greenleaf said. "We are not taking your application lightly."

"I didn't mean to imply anything like that," Dan said, thinking, This guy is out for blood.

Greenleaf shifted his gaze from Dan to the wall screen before him. "I can see that your device has performed within your design criteria quite reliably."

"Good," said Dan, relieved.

"Except in one respect," Greenleaf went on.

"What? What do you mean?"

"Long-term reliability," said Greenleaf. "The longest flight in your testing program was a mere two weeks, and even then it was at low power."

"I wouldn't call it low power," Dan said, testily. "And the IAA seemed very happy with the data we got from that test flight."

Pancho and Amanda had flown the test rig on a parabolic trajectory that took them around the planet Venus. The ship carried a full panoply of instrumentation for making observations of the planet as it flew by a scant thousand kilometers above Venus' glowing clouds. A team of planetary astronomers had provided the equipment and monitored the flight, all of them from universities that belonged to the IAA, all of them ecstatically happy and grateful for the data that the flight brought back—for free.

"Two weeks is not a sufficient endurance test," Greenleaf said flatly.

Pancho snapped, "It's long enough to get us to the Belt."

"Under full power."

"What else?"

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"I cannot authorize a crewed flight to the Asteroid Belt until you have demonstrated that your propulsion system can operate reliably at full power for the time it would take to complete the mission."

Dan felt burning anger rising in his throat. Pancho looked as if she wanted to reach across the table and sock the guy. But then he realized that Amanda was looking not at Greenleaf, but at Humphries, who sat calmly in his chair, his face as expressionless as a professional card shark, his hands in his lap.

"Even your flight past Venus was an infraction of IAA regulations," Greenleaf said, as if justifying himself.

"We filed the flight plan with the IAA," Dan responded hotly.

"But you didn't wait for authorization, did you?"

"It was a test flight, dammit!"

Greenleaf's face flashed red. And Dan finally realized what he was up against. Oh, by all the saints in New Orleans, he said to himself, he's a New Morality bigot. They've infiltrated the IAA.

"I am not going to argue with you," Greenleaf said flatly. "You will be required to fly your device for four weeks at full power before you can receive approval for crewed missions."

He pushed his chair back and got to his feet, stumbling in the low lunar gravity despite the weighted boots he wore.

"Four weeks!" Dan blurted. "We can fly to the Belt and back in four weeks under full power."

"Then do so," said Greenleaf, smugly. "But do it under remote control. Without any crew."

He headed for the door, leaving Dan sitting at the table, angry, stunned, and feeling betrayed.

"I'd better get after him," Humphries said, getting up from his chair. "We don't want him angry at us."

"Why the hell not?" Dan grumbled.

Humphries left the conference room. Dan sagged back in his chair. "Flying an uncrewed mission to the Belt doesn't make a dime's worth of sense," he muttered. "It's just an exercise that costs us four weeks' time and almost as much money as a crewed mission."

Pancho said, "Four weeks isn't so bad. Is it?"

"It's four weeks closer to bankruptcy, kid. Four weeks closer to letting that Humper take over my company."

In a very small voice, Amanda said, "It's my fault, actually."

Dan looked at her.

"Martin . . ." she hesitated, then said, "Martin doesn't want me to go on the mission. I'm sure he's had some influence on Dr. Greenleaf's position."

"He doesn't want you to go?" Dan asked.

Pancho explained, "He's bonkers about Mandy."

Dan spent a moment digesting that news, then asked, "And how do you feel about him, Amanda?"

"Trapped," she replied immediately. "I feel as though there's nowhere on Earth I can go to get away from him. Or the Moon, for that matter. I feel like a trapped animal."

Dan left the two women and went to his office. As he slipped into his desk chair, he commanded the phone to locate his chief counsel, the woman who headed Astro's corporate legal department.

The phone computer system found her on the ski slopes in Nepal. Her image was faint and wavered noticeably. She must be holding her wrist communicator in front of her face, Dan thought. He could see a bit of utterly blue sky behind her. She was in ski togs, polarized sun goggles pushed up on her forehead, and not at all happy about being buzzed by the boss.

"What in the nine billion names of God are you doing in Nepal?" Dan asked, irritated. Then he had to sit, fuming, for the few seconds it took for his message to reach the lawyer and her reply to get back to him.

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"Trying to get in some skiing while there's still snow left," she snapped, equally irked.

"Skiing?"

"I do get some vacation time now and then," she said, after the usual pause. "This is the first time I've taken any since lord knows when."

Through gritted teeth, Dan explained the IAA inspector's decision to her.

"You could appeal," she said, once she understood the situation, "but that would take longer than running the uncrewed test flight he wants you to do."

"Couldn't we ask for another hearing, a different inspector?" Dan demanded. "This guy's a New Morality fanatic and they're dead-set against space exploration."

The lawyer's face hardened when she heard Dan's words. "*Mr.* Randolph," she said, "I am a member of the New Morality and I'm not a fanatic. Nor am I against space exploration."

Feeling surrounded by enemies, Dan said, "OK, OK. So I exaggerated."

She said nothing.

"Can we claim an asteroid with an uncrewed spacecraft?"

"No one can claim ownership of any body in space," her reply came back. It was what Dan had expected. Then she went on, "No planet, moon, comet, asteroid—no celestial body of any kind. That's been international law since the Outer Space Treaty of 1967, and subsequent amendments and protocols."

Trust a lawyer to use two dozen words when one will do, Dan groused to himself.

She went on, "Individuals are allowed to have exclusive use of part or all of a celestial body, for the purpose of establishing a human habitation or extracting natural resources. In that instance, corporations are regarded as individuals."

"So could Astro Corporation claim *use* of an asteroid that an uncrewed Astro spacecraft rendezvouses with?"

Nearly three seconds later she replied, "No. Such a claim can only be made by humans on the scene of the claim itself."

"But the double-dipped spacecraft would be under human control, remotely, from Selene."

Again the lag, and again the answer, "No, Dan. It's not allowed. Otherwise corporations would be able to send miniprobes all over the solar system and claim everything in sight! It would be like the efforts to patent segments of DNA and living organisms, back around the turn of the century."

"So an uncrewed test flight wouldn't do us any good at all," he said.

Once she heard his question, the lawyer answered, "That's a decision that you'll have to make, Dan. I'm just a lawyer; you're the CEO."

"Thanks a lot," Dan muttered.

LUNAR ORBIT

"She looks better now, doesn't she?" Dan asked as their jumper coasted toward the fusion-powered spacecraft.

Pancho nodded her agreement. The ship was still utilitarian, not sleek, but now the starkness of the bare engine system by itself was dwarfed by six huge, gleaming spherical propellant tanks. Big white letters stencilled along the cylindrical crew module identified the craft as STARPOWER 1; the logos of Astro Corporation, Humphries Space Systems and Selene adorned one of the propellant tanks.

The jumper was little more than an ordinary lunar transfer buggy with an extra set of tankage and a bigger rocket engine for ascents from the Moon's surface into lunar orbit and descents back to the ground again. Dan and Pancho wore tan Astro coveralls as they rode in the bulbous glassteel crew module, standing with their booted feet anchored in floor loops because seats were not needed for this brief, low-g flight. An instrument podium rose at the front of the module, its controls standing unused, since the vessel was being handled by the flight controllers back at Armstrong. Still, Dan felt glad that Pancho was a qualified pi-

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lot. You never know, he thought.

As they approached the fusion-powered vessel, Pancho whistled at the size of the propellant tanks.

"That's a lot of fuel."

"Tell me about it," Dan said ruefully. "I've had to default on two helium-three contracts with Earthside power utilities to fill those double-damned tanks."

"Default?"

Nodding, Dan said grimly, "Two steps closer to bankruptcy."

Pancho decided to change the subject, slightly. "So what've you decided to do about the long-duration test?" Pancho asked.

Dan shook his head. "I've spent the past four days pulling every wire I know."

"And?"

"Nothing so far. Zip. Nobody's going to lift a finger to go against the IAA."

"So you'll have to do the test flight?"

Running a finger across his chin, Dan said reluctantly, "Looks that way."

"Then why are we takin' this ride?"

The shadow of a smile crossed Dan's face. He was thinking of the time, many years earlier, when he had briefly become a privateer, a pirate, hijacking uncrewed spacecraft for their cargoes of ore. It had started as a desperation ploy, the only way a frustrated Dan Randolph could force open the space markets that had been closed by monopolists. He had won his war against monopoly and opened the solar system to free competition among individuals, corporations and governments. But at a price. His smile faded as he remembered the people who had died fighting that brief, unheralded war. He himself had come to within a whisker of being killed.

"So?" Pancho prodded, "is this a joyride or what?"

Putting his thoughts of the past behind him, Dan replied, "I want to see the crew module for myself. And we're going to meet the planetary geologist that Zack Freiberg's picked out for us."

"The asteroid specialist?"

"Yep. He's aboard the ship now. Came up to Selene yesterday and went straight to the ship. He slept aboard last night."

Pancho huffed. "Eager beaver. College kid, I bet."

"He's got a mint-new degree from Zurich Polytech."

The flight controllers brought the jumper to a smooth rendezvous with *Starpower 1*. While Dan and Pancho stood watching, the little transfer buggy linked its airlock adapter section to the hatch of the bigger vessel. They floated through the womblike adapter and opened the fusion ship's airlock hatch.

The airlock opened into the midsection of the crew module. To their left, Dan saw the accordion-fold doors of a half-dozen privacy compartments lining the passageway. Further up were the galley, a wardroom with a table and six small but plush-looking chairs, and—past an open hatch—the bridge. To the right was the lavatory and a closed hatch that led to the equipment and storage bays.

Dan headed left, toward the galley and the bridge.

"Chairs?" Pancho asked, looking puzzled, as they pushed weightlessly past the wardroom, floating a few centimeters above the deck's carpeting.

"You'll be accelerating or decelerating most of the way," Dan pointed out. "You won't be spending much time in zero-g."

She nodded, looking disappointed with herself. "I knew that; it just didn't latch."

Dan understood how she felt. He'd seen the layout of the crew module hundreds of times, viewed 3-D mockups and even walked through virtual reality simulations. But being in the real thing was different. He could smell the newness of the metal and fabric; he could reach his hand up and run his fingers along the plastic panels of the overhead. The bridge looked small, but shining and already humming with electrical power.

"Where's our college boy?" Pancho

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asked, looking around.

"That would be me, I suppose," said a reedy voice from behind them.

Turning, Dan saw a husky-looking young man gripping the edges of the open hatch with both hands. He was a shade shorter than Dan, but broad in the shoulders, with a thick barrel chest. The build of a wrestler. His face was broad, too: a heavy jaw with wide, thin lips and small, deep-set eyes. His hair was cropped so close to his skull that Dan couldn't be sure of its true color. He wore a small glittering stone in his left earlobe, diamond or zircon or glass, Dan could not tell.

"I heard you enter. I was in the sensor bay, checking on the equipment," he said in a flat Midwestern American accent, pronounced so precisely that he had to have learned it in a foreign school.

"Oh," said Pancho.

"I am Lars Fuchs," he said, extending his hand to Dan. "You must be Mr. Randolph."

"Pleased to meet you, Dr. Fuchs." Fuchs' hand engulfed his own. The young man's grip was strong, firm. "This is Pancho Lane," Dan went on. "She'll be our pilot on the flight."

Fuchs dipped his chin slightly. "Ms. Lane. And, sir, I am not Dr. Fuchs. Not yet."

"That's OK. Zack Freiberg recommends you highly."

"I am very grateful to Doctor Professor Freiberg. He has been very helpful to me."

"And my name is Dan. If you call me Mr. Randolph, it'll make me feel like an old man."

"Oh, I wouldn't want to offend you, sir!" Fuchs said, genuinely alarmed.

"Just call me Dan."

"Yes, sir, of course. And you must call me Lars." Turning to Pancho, he added, "Both of you."

"That's a deal, Lars," said Pancho, sticking out her hand.

Fuchs took it gingerly, as if not quite sure what to do. "Pancho is a woman's name in America?"

She laughed. "It's *this* woman's name, Lars old buddy."

Smiling uneasily, Fuchs said, "Pancho," as if testing out the name.

"You handle weightlessness very well," Dan said. "From what Zack told me, this is your first time off-Earth."

Fuchs said, "Thank you, sir . . . Dan. I came up last night so I could adapt myself to microgravity before you arrived here."

Pancho smiled sympathetically. "Spent the night makin' love to the toilet, huh?"

Looking flustered, Fuchs said, "I did retch a few times, yes."

"Ever'body does, Lars," she said. "Nothin' to be ashamed of."

"I am not ashamed," he said, his chin rising a notch.

Dan moved between them. "Have you picked out which cabin you want for yourself? Since you were first aboard you get first pick."

"Hey," Pancho griped, "I've been aboard this buggy before, you know. So has Amanda."

"The privacy compartments are all exactly alike," Fuchs said. "It doesn't matter which one I get."

"I'll take the last one on the left," Dan said, peering down the passageway that ran the length of the module. "It's closest to the lav."

"You?" Pancho looked surprised. "Since when are you comin' on the mission?"

"Since about four days ago," Dan said. "That's when I made up my mind . . . about a lot of things."

PELICAN BAR

"So here's my plan," Dan said, with a grin.

He and Pancho were hunched over one of the postage-stamp-sized tables in the farthest corner of the Pelican bar, away from the buzzing conversations and bursts of laughter from the crowd

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standing at the bar itself. Their heads were almost touching, leaning together like a pair of conspirators.

Which they were. Inwardly, Dan marvelled at how good he felt. Free. Happy, almost. The double-damned bureaucrats have tried to tie me up in knots. Humphries is behind it all, playing along with the IAA and those New Morality bigots. Those uptight psalm-singers don't want us to reach the asteroids. They like the Earth just the way it is: miserable, hungry, desperate for the kind of order and control that the New Morality offers. This greenhouse warming is a blessing for them, the wrath of God smiting the unbelievers. Anything we do to try to help alleviate it, they see as a threat to their power.

Vaguely, Dan recalled from his childhood history lessons something about a group called the Nazis, back in the twentieth century. They came to power because there was an economic depression and people needed jobs and food. If he remembered his history lessons correctly.

So the New Morality has its tentacles into the IAA now, Dan thought. And the GEC too, I'll bet. And Humphries is playing them all like a symphony orchestra, using them to stymie me long enough so he can grab Astro from me.

Well, it's not going to be that easy, partner.

"What's so funny?" Pancho asked, looking puzzled.

"Funny?"

"You say, 'Here's my plan,' and then you start grinnin' like a cat in a canary's cage."

Dan took a sip of his brandy and dry, then said, "Pancho, I've always said that when the going gets tough, the tough get going—to where the going's easier."

"I've heard that one before."

"So I'm going with you."

"You?"

"Yep."

"To the Belt."

"You need a flight engineer. I know the ship's systems as well as anybody."

"Lordy-lord," Pancho muttered.

"I'm still a qualified astronaut. I'm going with you."

"But not until we do the uncrewed test flight," she said, reaching for her beer.

Leaning across the table even closer to her, Dan said in a hoarse whisper, "Screw the test flight. We're going to the Belt. You, Amanda, Fuchs and me."

Pancho nearly choked on her mouthful of beer. She sputtered, coughed, then finally asked, "What're you drinkin', boss?"

Happy as a pirate on the open sea, Dan said, "We'll let 'em think we're doing exactly what they've told us to do, except that the four of us will happen to be aboard the bird when she breaks orbit."

"Just like that?"

"Just like that. We'll calculate a new flight plan once we're underway. Instead of accelerating at one-sixth g, as we've planned, we'll goose her up to one-third g and cut the flight time by more than half."

Pancho looked unconvinced. "You better bring an astrogator aboard."

"Nope." Pointing a finger at her, Dan said, "You're it, kid. You and Amanda. I'm not bringing anybody into this that we don't absolutely need."

"I'm not so sure about this," Pancho said warily.

"Don't go chicken on me, kid," Dan said. "You two have been studying this point-and-shoot technique for a lot of weeks. If you can't do it, I've been wasting money on you."

"I can do it," Pancho said immediately.

"OK, then."

"I'd just feel better if you had a real expert on board."

"No experts. Nobody else except the four of us. I don't want anybody tipped off about this. And that includes Humphries."

Pancho waved a hand nonchalantly. "He hasn't said a word to me since we

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moved Sis."

"I don't think he knows where we stashed her," Dan said, reaching for his drink.

"He knows about ever'thing."

"Not this flight," Dan said firmly. "*Nobody* is going to know about this. Understand me? Don't even tell Amanda or Fuchs. This is just between you and me, kid."

"And the flight controllers," Pancho muttered.

"What?"

"How're you goin' to get the flight controllers to go along with this? You can't just waltz aboard the *Starpower* and light her up without them knowin' it. Hell's bells, Dan, you won't even be able to hop up to the ship if they don't let you have a jumper and give you clearance for takeoff."

Sipping at his brandy-laced ginger beer, Dan admitted, "That's a problem I haven't worked out yet."

"It's a toughie."

"Yep, it is," Dan said, unable to suppress a grin.

Pancho shook her head disapprovingly. "You're *enjoying* this."

"Why not?" Dan replied. "The world's going to hell in a handbasket, the New Morality is taking over the government, Humphries is trying to screw me out of my own company—what could be more fun than hijacking my own spacecraft and riding it out to the Belt?"

"That's weird," Pancho murmured.

Dan saw that his glass was empty. He pressed the button set into the table's edge to summon one of the squat little robots trundling through the crowd.

"Don't worry about the flight controllers," he said casually. "We'll figure out a way around them."

"We?"

"You and me."

"Hey, boss, I'm a pilot, not a woman of intrigue."

"You made a pretty good spy."

"I was lousy at it and we both know it."

"You hacked into Humphries' files."

"And he found out about it in half a minute, just about."

"We'll think of something," Dan said.

Pancho nodded, then realized that she had already thought of something.

MISSION CONTROL CENTER

The timing had to be just right.

Nervous despite being invisible, Pancho edged cautiously into the Armstrong spaceport's mission control center. It was nearly two A.M. The center was quiet, only two controllers on duty and both of them were relaxed, one leaning back in his chair while the other poured coffee at the little hotplate off by the door to the lav.

Pancho hadn't told anyone about this caper. She thought it best to borrow the stealth suit and get the job done without bringing anyone else into the picture, not even Dan Randolph. The fewer people who knew about the stealth suit, the better.

No landings or takeoffs were scheduled at this hour; the skeleton crew was in the control center strictly because prudent regulations required that the center always be manned, in case an emergency cropped up.

How could there be an emergency? Pancho asked herself as she slowly tiptoed to the console farthest from those being used by the pair of controllers. Spacecraft don't just zoom in on the spur of the moment; even a max-thrust flight from one of the space stations orbiting Earth takes six hours to reach the Moon. Plenty of time to rouse the whole crew of controllers if they were needed. The only possible emergency would be if one of the teams at a remote outpost on the lunar surface ran into a jam. Maybe if an astronomer at the Farside Observatory suddenly developed a case of appendicitis and their radio was out so they sent the poor boob on a ballistic lob to Selene without being able to alert anybody first. That was just about the only emergency Pancho could think of.

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Or if an invisible woman sneaked in and jiggered the flight schedule for tomorrow's launches. No, Pancho thought, not tomorrow's. It's already past two in the morning. Today's schedule.

She sat at one of the unattended consoles, as far from the human controllers as possible, and waited for the woman at the coffee urn to return to her post. The overweight guy sitting at his console looked half asleep, feet up on the console, eyes closed, a pair of earphones clamped over his head. They weren't the regulation earphones, either. The guy was listening to music; Pancho could see the rhythmic bobbing of his head.

Hope it's a lullaby, she said to herself.

The woman controller took a sip of her coffee and made a sour face. Then she looked straight at Pancho. Inside the stealth suit, Pancho froze. The moment passed. The woman's gaze shifted and she started back toward her console, her steaming coffee mug in one hand. Pancho began to breathe again.

The woman came back to her console, next to the guy, gave him a disapproving frown, then sat down and clapped a regulation earphone and pin mike set to her head.

Good, thought Pancho. The big chamber was too quiet to suit her. Normally the rows of consoles would be filled with controllers talking to the traffic coming in and out of Selene. There would be plenty of background chatter to hide her pecking at a keyboard. But then there wouldn't be any empty consoles to use; they'd all be occupied during normal working hours.

Pancho tentatively tapped on the keyboard before her, once to silence the voice system, then again to call up the status board. The woman at her console did not hear the faint clicks. Or if she did, she paid no notice. The guy was definitely asleep, Pancho thought, his head lolling on his shoulders now, his bulging belly rising and falling in deep, slow breathing.

Only one craft on the schedule, Pancho saw from the status display. Due to land in five hours. Plenty of time for her to do what she had to and get out before more controllers began filing in for the morning shift.

Slowly, cautiously, with one eye on the bored woman sitting on the other side of the room, Pancho tapped out a set of instructions for the morning's schedule. Then she got up, quietly left the control center, and returned the stealth suit to Ike Walton's locker, up in the storage area near the catacombs. She wondered if she'd ever need it again. Maybe I ought to keep it, she thought. But then Ike would discover it was gone, sooner or later, and that would raise a stink. Better to let it stay here and just hope Ike doesn't change the combination on the lock.

Sudden panic hit Pancho. Elly was not in the locker, where she had left her. Pancho had thought that the krait would snooze away in the chilly air of the storage area; she had fed Elly a mouse only a day earlier, and that usually left the snake in a pleasantly drowsy state of digestion. But moving her to Walton's locker must have disturbed Elly's torpor. The snake had slithered through one of the air slits in the bottom of the locker door.

For several frantic minutes Pancho searched for the krait. She found her at last, curled on the floor in front of a heating vent. But when she tried to pick Elly up, the krait reared and hissed at her.

Pancho got down on both knees and frowned at the snake. "Don't you go hissy on me," she said sternly. "I know I disturbed your nap, but that's no reason to get sore."

The snake's tongue flicked in and out, in and out.

"That's right, take a good sniff. It's me, and if you'll just calm yourself down, I'll wrap you around my nice warm ankle and we can get back home. OK?"

Elly relaxed and sank back into a tight

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little coil of glittering blue. Pancho slowly extended her hand and when Elly didn't react, she stroked the krait's head gently with one finger.

"Come on, girl," she crooned, "we're gonna take you home where you can sleep nice and comfy."

But not for long, Pancho added silently.

HUMPHRIES TRUST RESEARCH CENTER

Martin Humphries was awakened from a dream about Amanda by the insistent shrill of his personal phone.

It wasn't a sexual dream. Strangely, when he dreamed of Amanda it was never sexual. They were on a yacht this time, sailing across a calm azure sea, standing up by the prow and watching dolphins leaping across the ship's bow wave. He felt nervous on the water, unable to shake the fear of drowning even in this idyllic setting.

Amanda stood by the rail, wearing a lovely pale blue dress; the soft breeze tousling her hair. She gazed at him with sad eyes.

"I'll be leaving soon," she said unhappily.

"You can't leave me," Humphries said to her. "I won't let you leave."

"I don't want to, darling. But they're forcing me to. I must go. I have no choice."

"Who?" Humphries demanded. "Who's forcing you?"

"You know who, dearest," said Amanda. "You know. You're even helping him."

"It's Randolph! He's taking you away from me!"

"Yes," Amanda said, her eyes pleading with him to help her, to save her.

And then the damned phone woke him up.

He sat up in his bed, blazingly angry. "Phone!" he called out. "On the art screen."

A reproduction of a Picasso nude disappeared to reveal the somber face of his security chief.

"Sorry to wake you, sir," the man said, "but you said you wanted to be personally informed of Ms. Cunningham's movements."

With a glance at the digital clock on the nightstand, Humphries demanded, "Where's she going at four in the fricking morning?"

"She's apparently asleep in her room, sir, but—"

"Then what are you bothering me for?" Humphries bellowed.

The security man swallowed visibly. "Sir, her name has just appeared on a flight manifest."

"Flight manifest?"

"Yessir. She and three other people are scheduled to go to the Starpower ship, up in orbit."

"Now? Today?"

"Scheduled for eight this morning, sir."

Four hours from now, Humphries realized. "And this flight manifest just came up on the launch schedule?"

"About an hour ago, sir."

"Why are they going to *Starpower 1*?" Humphries wondered aloud.

"That vessel is scheduled for launch on a test flight at nine o'clock, sir."

"I know that," Humphries snapped. "It's an unmanned long-duration flight."

"Perhaps they're going up for a last-minute checkout, before the ship is launched out of orbit."

"Three other people going with her, you say? Who are they?"

The security chief read off the names. "P. Lane, command pilot; L. Fuchs, mission scientist; and C. N. Barnard, flight surgeon."

"I know Lane," Humphries said. "Who are the other two?"

"Fuchs is a graduate student from Zurich Polytechnical Institute. He just arrived in Selene a few days ago. Barnard is apparently a medic of some sort."

"Apparently?"

Looking uncomfortable, the security chief replied, "He's an Astro employee.

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We have no background data on Barnard, sir. No ID photo, either. All that we've been able to pull up from Astro's files are his name, his position, and his fingerprints and retinal scan."

"Dan Randolph," Humphries growled. "It's an alias for Randolph!"

"Sir?"

"Check those prints and retinal scan against Dan Randolph's file."

"Yessir."

"And send a couple of men to Amanda Cunningham's quarters. Bring her here, to me."

"Right away, sir."

The wall screen went blank for an instant, then the Picasso image reappeared. Humphries paid no attention. He leaped out of bed, snarling aloud, "That fucking Randolph thinks he's going to zip off to the Belt and take Amanda with him. Like hell he will!"

"Come on, Mandy," Pancho urged. "Dan's prob'ly waitin' for us already!"

"One more minute," Amanda said, from the lav. "I've just got to—"

Somebody pounded impatiently on the door.

"Oh, hell!" Pancho said.

Amanda came out of the lavatory. "I'm ready, Pancho. Sorry to keep you waiting."

Pancho opened the door. Instead of Dan Randolph, two strangers stood out in the corridor. Both were men, wearing identical dark gray business suits. One with long blond hair and a nice full moustache, the other a taller, darker man with a military crew cut. Both were big-shouldered and stone-faced. They looked like cops to Pancho.

Shit! Pancho thought. They know I hacked into the flight schedule.

But the blond said, "Amanda Cunningham? Come with us, please."

Pancho hiked a thumb over her shoulder. "That's her. And she's not goin' anywhere with you. We're late for work already."

They pushed past Pancho and entered the room. "You'll have to come with us, Ms. Cunningham," the blond said.

"Why? On whose authority?"

"Mr. Humphries wants to see you," the buzz cut said. His partner frowned at him.

Pancho said, "Now wait a minute—"

"Don't interfere," the blond said sharply. "Our orders are to bring Ms. Cunningham to Mr. Humphries' residence. That's what we're going to do."

"Call security, Mandy," Pancho said. "These guys are workin' for Humphries."

Amanda started around the bed to the phone on the night table between their two beds, but the blond moved faster and blocked her way.

"We don't want to get physical," he said to Amanda, "but we've got a job to do and we're going to do it."

"How rough we get depends on you," said the darker man, grinning at Amanda.

She stared at them, wide-eyed, somewhere between confusion and terror.

The blond took another step toward Amanda. "Come along now, honey. We don't want to hurt anybody."

Mandy stumbled back, away from him. Pancho saw that both men were focused on her. She swiftly bent down and peeled Elly from her ankle.

"Here, wiseass," Pancho said as she hurled the bright blue snake at the blond.

He turned just fast enough to see the krait sailing in lunar slow motion toward his face. Instinctively he raised his arm to shield himself.

"What the hell!"

Elly bounced off the guy's arm and fell to the floor. She reared up, hissing angrily.

"Jesus Christ, what is it?"

The buzz cut was tugging at something inside his jacket. Pancho chopped at the back of his neck and he sagged to the floor. Elly slithered toward him. The blond seemed frozen with fright, staring at the snake.

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Pancho gestured to Amanda, who stepped past the goggle-eyed blond and came to her side.

The guy on the floor pushed himself up on one elbow and saw the snake rearing a bare ten centimeters in front of his face, its beady eyes staring at him.

"Aaaggh," he moaned.

The blond pulled a small pistol from the holster beneath his jacket. Pancho saw that his hand was shaking badly.

"Loud noises annoy her," she said. "Just be quiet and don't move."

The blond glanced at her, then returned his stare to the snake. The buzz cut was sweating as Elly stood before him, her tongue flicking in and out.

"D . . . do something," he whispered hoarsely.

"Better drop your gun on the bed," Pancho to the blond. "If you shoot and miss her, she'll bite him for sure."

The blond tossed the gun onto the bed. "Get it out of here," he pleaded.

Pancho started to lean forward, slowly, carefully, bending toward Elly. But the buzz cut's nerve broke. He swung blindly at the snake and tried to scramble to his feet. Elly sank her fangs into the meaty side of his hand.

He screamed and sagged back to the floor, unconscious. Pancho bent over and scooped Elly up, careful to hold her so the krait couldn't twist and bite her.

"He'll be dead in an hour 'less you get the antiserum into him," Pancho said quickly.

The blond stared at his partner helplessly.

"Take him to the hospital!" Pancho shouted.

She headed for her travel bag, still on her bed, next to the blond's discarded gun. Still holding Elly, she rummaged in the bag until she found the vial of antiserum and tossed it to the blond.

"Get him to the hospital! Now! Tell 'em what happened and give 'em this. It's the antiserum."

Then she grabbed her still-open travel bag and headed for the door. Amanda came right behind her, then rushed back in to get her own bag. As they hurried down the corridor together, Pancho glanced back over her shoulder and saw the blond lugging his unconscious partner in the other direction, toward the hospital.

"Good girl, Elly," she said. The krait had wrapped itself contentedly around Pancho's wrist.

When they got to the spaceport tunnel Dan Randolph was pacing angrily.

"Where the hell have you been? We're running late."

"I'll tell you all about it, boss," Pancho said as they climbed aboard the cart.

"It's Martin," Amanda said, her voice low.

"Humphries?" asked Dan.

"He wants Mandy, and I think he knows we're tryin' to get out of here."

"What the hell happened?" Dan demanded.

Pancho told him as the automated cart rode down the tunnel to the spaceport.

Martin Humphries sat at his desk, staring coldly at the frightened, worried face of the blond security agent. The man was sweating and nervously brushing at his moustache with a fingertip.

"So you let her get away," Humphries said, after the man had explained his failure for the third time.

"My partner was dying!" the blond said, his voice ragged. "That motherfucking snake bit him!"

"And you let Ms. Cunningham get away," Humphries repeated, icily.

"I had to take him to the hospital. He would've died otherwise."

"You didn't phone me, or security, or anyone who might have prevented her leaving."

"I'm phoning you now," the blond said, with some heat. "They're just about making their rendezvous with the *Starpower* ship. You can call the control center and have them abort the mission."

"Can I?"

"There's still time."

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Humphries clicked off the connection. Stupid clod, he thought. I send him to do one simple thing and he fucks it up completely.

"Abort the mission," he said aloud. Then he shook his head. I should call the control center and tell them that Dan Randolph is hijacking my vessel and taking the woman I love along with him. That would be a lovely item for the scandal nets. Everyone would laugh themselves sick at me.

He leaned back in his contoured chair, but its softly yielding padding failed to soothe him. Amanda's running off with Randolph. He's probably been hot for her all the time, just waiting to get her away from me. Well, now they can be together. She prefers him to me. So she can die with him.

His teeth hurt. With some surprise, Humphries realized that he'd clamped his jaw so tight it was making his whole head ache. His neck and shoulders were painfully stiff with tension. His fists were clenched so tightly he could feel his fingernails cutting into his palms.

Amanda's gone off with him. I'll acquire Astro, but I've lost her forever. They'll die together. It's not my fault. I didn't want to kill anybody. They're doing it to themselves. She's killing herself.

He wished he could cry. Instead, he glanced at the list of major Astro stockholders that was displayed on his desktop screen. And he punched his right fist into the screen, exploding it in a shower of sparks and plastic shards.

STARPOWER 1

Fuchs met them at the spaceport, wondering why the four of them were going to the ship a bare hour before it was due to leave orbit and head out to the Belt.

"There's been a change in plans, Lars," Dan told him. "We're going along, too."

The young man's dark brows lifted halfway to his scalp. "The IAA has approved this?"

"That doesn't make any difference," Dan said as Amanda and Pancho clambered into the tractor waiting to take them to the jumper out on the launch pad. "We're going."

Fuchs hesitated, standing in the open airlock hatch of the tractor.

"We're going," Dan repeated. "With you or without you."

A slow smile spread across Fuchs' broad face. "With me," he said, and hopped up into the tractor, clearing its six steps with ease.

Dan grinned and resisted the urge to imitate the younger man's athleticism. Amanda and Pancho had taken the two rear seats, Fuchs the one next to the hatch. Dan sat behind the driver's seat as the driver herself closed the airtight hatch and then checked out the cab's pressurization. She got behind the wheel and slipped on her headset. She's waiting for authorization from the controller to go out, Dan knew. If they're going to stop us, this'd be the easiest time for them to do it.

But after a few moments' wait, she put the tractor in gear and rolled to the garage's airlock. A few minutes later they were at the jumper, connecting the flexible access tube from the tractor's hatch to the airlock hatch on the jumper's crew module. In their flight coveralls, the four of them stepped carefully along the springy plastic of the narrow tube, hands touching the walls, heads bent slightly to keep from brushing the low ceiling.

Small as it was, the jumper's hab module was better than the claustrophobic tube. It was little more than a few square meters of metal deck enclosed in a glassteel bubble. A control console stood up front on a waist-high pedestal. Pancho went to the control console and pulled on one of the headsets hanging there; Amanda took up her post on Pancho's right.

"Better use the foot loops," Dan said to Fuchs. "We'll be in zero-g for a few minutes."

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Fuchs nodded. He looked tense, expectant, his thin lips tightly closed.

They can stop us at any time, Dan told himself. But as each second ticked by, he felt better and better.

"Five seconds and counting," Pancho told them. She hadn't bothered to turn on the speaker built into the console.

Just as Dan reached out to clasp one of the handgrips along the curving inner surface of the bubble, the jumper leaped off the ground with a single short, sharp bang of its ascent rocket. Dan's knees flexed, but Fuchs nearly buckled. Dan grabbed his arm to steady him.

"I . . . I'm sorry," Fuchs apologized. "I didn't expect it."

"It's OK," said Dan, impressed by the hard muscle he felt. "This is only your second launch, isn't it?"

Fuchs looked pale. "My second from the Moon's surface. I also rode the shuttle from the Zurich aerospace port."

Dan saw that zero-g was making Fuchs queasy. "Are you going to be OK?" he asked. Nothing worse than having the guy next to you upchucking all the way to rendezvous.

With a weak smile, Fuchs pointed to his well-muscled biceps. "I took the precaution of wearing a medicinal patch."

"Good," Dan said.

"And also these." He pulled a thick wad of retch bags from the thigh pocket of his coveralls.

"Smart man," Dan said, hoping that Fuchs wouldn't have to use them.

Under control from the ground, the jumper made rendezvous with *Starpower 1* and docked with the fusion ship's main airlock hatch. Dan felt the slightest of thumps as the jumper's adapter section locked onto the ship's hatch.

"Confirm docking," Pancho said into her pin mike. "You guys did a good job. I didn't have to touch the controls once."

Whatever the controller said back to her made Pancho laugh. "Yeah, I know; that's why you drag down the big bucks. OK, we're goin' aboard now."

Turning to Dan, Pancho said, "I'll set her up for automatic separation and return to Selene."

"Right," said Dan, lifting free of his foot restraints and floating to the hatch. As far as the controllers back at Armstrong spaceport were concerned, the four of them were to be aboard *Starpower 1* only for a final checkout before the ship was launched out of orbit. They were expected to return to Selene on the jumper.

"They're gonna be kinda surprised when this li'l buggy lands and nobody's in it," Pancho said, with a mischievous grin.

Dan went through the jumper's hatch and into the coffin-sized adapter section. He tapped out the entry code to open the fusion ship's airlock hatch.

"OK," he said, once the hatch had swung open. "Let's get aboard the Beltline express."

"You first, boss," said Pancho. "You're the owner."

He grunted. "One-third owner. I imagine at least one of the other two is going to be mighty slammed once he figures out what we're doing."

"But he must have figured that out already," Amanda said.

"Right," Pancho agreed. "Why else would he send those goons after Mandy?"

Dan felt his brow furrow. "Then why isn't he raising a howl? Why isn't he trying to stop us?"

Fuchs looked back and forth from Amanda to Pancho to Dan, clearly baffled by their conversation.

"Well, let's get aboard before he does start hollerin'," Pancho said, making a shooing motion toward Dan with both her hands.

Feeling suddenly uneasy, Dan sailed through the hatch and entered *Starpower 1*. He hovered at the airlock's inner hatch as Pancho came through and pushed off straight toward the bridge. Amanda started through the hatch, but stumbled slightly. Fuchs grasped her by the shoulders, steadying her.

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"Thank you, Lars," Amanda said.

Dan thought the kid's face turned red for a moment. He let her go and Amanda sailed through both hatches without needing to use her hands or feet. Fuchs, still a newcomer to zero-g, gripped the edges of the hatch with both his meaty hands and cannonballed through. He thumped painfully against the far bulkhead. Dan said nothing, suppressing his laughter at the young man's attempted display of athletic prowess.

But as he sealed the hatches his mood darkened. I warned Amanda about coming on to a guy. He realized that she was wearing ordinary coveralls, but still—I'll have to play chaperon between her and Fuchs, Dan told himself.

He headed up to the bridge, "swimming" in zero gravity by flicking his fingertips against the passageway bulkheads to propel himself weightlessly forward.

Pancho had strapped herself into the command pilot's chair, busily working both hands across the control board. Through the wide glassteel ports above the board, Dan could see the dead gray curve of the Moon's limb and, beyond it, the beckoning bright crescent of the glowing Earth.

"I just disconnected ground control," she said. "They oughtta start squawkin' about it just about . . . now."

"Put them on the speaker," said Dan.

Amanda glided into the copilot's chair and buckled the safety harness. Fuchs came up behind her and slid his feet into the restraint loops on the floor.

"We have a disconnect signal, S-1," came a man's voice from the speaker. He sounded more bored than annoyed.

Pancho looked over her shoulder toward Dan, who placed a finger before his lips. "Run silent, run deep," he whispered.

Cupping her pin mike with one hand, Pancho said, "I'm ready to separate the jumper."

"Do it," Dan replied.

"Jumper separation sequence initiated," Pancho said into her mike.

"Are you aboard the jumper?" asked the controller. "We can't launch S-1 as long as that disconnect is in effect. We've lost command of the vehicle."

A red light flashed on the control panel, then winked off.

"Jumper separated," Pancho said.

"Repeat, are you aboard that jumper?" the controller asked, his voice rising with irritation.

"Where else would we be?" Pancho asked innocently. And she disconnected the radio link with Selene.

Amanda worked on the launch sequence program, her manicured fingers tapping dexterously on the touchscreen.

"Three minutes to launch," she said calmly.

"Gotcha," said Pancho.

Despite himself, Dan felt his palms go sweaty. Standing there behind the two pilots, ready to ride a man-made star out farther than any sane man has ever gone before. Everything I've got is riding on this bird, he said to himself. If we don't make it, I've got nothing to come back to. Not a double-damned thing.

He looked at Fuchs. The kid was smiling fiercely, like an old-time warrior watching the approach of an enemy army, waiting for the battle to begin, eager to get into it. He's got guts, Dan thought admiringly. We picked the right guy.

"Two minutes," Amanda called out.

"They must be goin' apeshit down there by now," Pancho said, grinning.

"Nothing they can do about it," said Dan. "They can't shoot us down."

"Couldn't they send a Peacekeeper vessel after us?" Fuchs asked.

"Once we light the fusion rocket," Dan answered, "*nothing* in the solar system will be able to catch us."

"Till we come back," said Pancho.

Dan frowned at the back of her head. Then he relaxed. "When we come back, we'll be rich."

"You'll be rich, boss," Pancho said. "The rest of us'll still be employees."

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Dan laughed. "You'll be rich, too. I'll see to that. You'll be rich."

"Or dead," Pancho countered.

"One minute," Amanda said. "I really think we should pay attention to the countdown."

"You're right," said Pancho.

Dan watched it all on the displays of the control board. The fusion reactor lit up as programmed. Star-hot plasma began generating energy. Through the MHD channel it roared, where a minor fraction of that heat energy was turned into electrical power. The ship's internal batteries shut off and began recharging. Cryonically cold liquid hydrogen and helium started pumping through the rocket nozzles' cooling walls. The hot plasma streamed through the nozzles' throats.

"Ignition," Amanda said, using the traditional word even though it was now without physical meaning.

"Thrust building up," Pancho said. Dan watched the curves rising on the thrust displays, but he didn't need to; he could feel weight returning, feel the deck gaining solidity beneath his feet.

"We're off and running," Pancho announced. "Next stop, the Asteroid Belt!"

Hours later, sitting in the tiny wardroom behind *Starpower*'s bridge, Dan Randolph felt truly relaxed for the first time in months. The ship was accelerating smoothly. Fuchs looked a lot better now, with the feeling of weight that came from the acceleration. No more floating in zero-g; they could sit in chairs without having to strap themselves down.

He marvelled at his good mood. The Earth's melting down, your corporation is going broke, you've busted every regulation the IAA ever wrote, Humphries is after your scalp, you're heading out for parts unknown, and you're sitting here with a grin on your face.

He knew why.

I'm free, he told himself. Maybe for only a couple of weeks, but I'm free of all of them, free of all their crap. We're on our own and nobody can bother us.

Until we come back.

Pancho ducked through the hatch and went straight to the juice dispenser.

"How's it going?" Dan asked casually.

"All systems working jus' fine," she said, filling a mug and coming to the table to sit next to Dan.

"Must be OK if you feel good enough to leave the bridge."

"Mandy's up there, keepin' an eye on ever'thing. The bird will actually fly on her own; we don't need to be on the bridge every minute of the day."

"Any incoming calls?" Dan asked.

She shrugged. "Only about six or seven million. Ever'body from Doug Stavenger to the Global News Network wants to talk to you."

"Global News?" Dan's ears perked up.

"Lots of news media. They all want to interview you."

Dan stroked his chin thoughtfully. "Might not be a bad idea. If we're going to do an interview it'll have to be before we get so far away the time lag makes it impossible to have a real-time conversation."

"Better do it quick, then," Pancho said. "Once we goose this bird to one-third g, we'll really be sprintin' fast."

Dan nodded his agreement. Pointing to the phone console built into the bulkhead, he asked, "Can you patch me through?"

"Easy."

"OK . . . lemme talk to La Guaira."

The head of Astro's corporate public relations staff was a sweet-faced redhead who was older—and much tougher—than she looked. Dan asked her if she could arrange a news conference with the world's major news networks.

"It has to be today," he pressed. "We're zipping out so fast that by tomorrow we won't be able to talk back and forth without a four-five minute lag."

"Understood," said the PR woman.

"Can you do it?"

She arched a carefully-drawn brow. "Arrange a major news conference with

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the man who's hijacked his own super-duper spaceship to go out past Mars and start mining the asteroids? Just get off the line, boss, and let me get to work."

Dan laughed and obliged. He was glad that he had decided to keep his public relations team intact, despite the layoffs in other corporate departments. Fire the accountants and the lawyers, he reminded himself. Get rid of the paper shufflers and bean counters. But keep the people who polish your public image. They're the last to go—except for the people who do the *real* work: the engineers and scientists.

Pancho watched him as she sipped at her juice. When Dan ended his call to La Guaira, she asked, "So now what happens?"

"Now we wait while my PR people do their jobs."

"Uh-huh. How long do you think it'll take?"

"We'll know in an hour or so," Dan said. "If it takes longer than that, it's not going to go down."

Pancho nodded. "I could hear it. The lag between you and her's already longer than the usual Earth-Moon delay."

Dan got to his feet and went to the coffee dispenser. He really wanted a pleasant glass of amontillado, but there was no alcohol on the ship.

Remembering the story the two women had told him about the goons Humphries had sent after Amanda, Dan asked, "Whatever happened to your snake?"

"Elly?

"Is that the snake's name?"

"Yup."

"So what'd you do with her?"

Pancho reached down to her ankle and came up with the glittering blue krait.

Dan flinched back. "You brought that thing aboard?"

Shrugging, Pancho said, "I was gonna leave it with Pistol Pete—he's the guy who owns the Pelican Bar. But with those goons and all, I didn't have the time."

"We've got a poisonous snake on the ship!"

"Relax, boss," Pancho said easily. "I've got four mice in my travelbag. That's enough to keep Elly fat and happy for a month."

Dan stared at the snake. Its beady eyes stared back at him.

He started to shake his head. "I don't want that thing on this ship."

"Elly won't be a problem," Pancho insisted. "I'll keep her in a nice, cool spot. She'll sleep most of the time." Then, with a smirk, she added, "And digest."

"But if something should happen . . ."

Pancho's face went deadly serious. She seemed to Dan to be struggling with herself.

He suggested, "Maybe we could freeze the snake for the duration of the flight. Thaw her out when we get back to Selene."

"She's not poisonous," Pancho blurted.

"What?"

"I don't like to admit it, but Elly's not really poisonous. I just tell people that to keep 'em respectful. You think Selene's safety board would let a poisonous critter into the city?"

"But you said . . ."

Looking almost apologetic, Pancho said, "Aw, you can't believe ever'thing I say, boss. A gal's got to protect herself, doesn't she?"

"But what about that guy she bit?"

"Elly was gengineered. They modified her toxin so she produces a tranquilizer, not a lethal poison."

Dan gave her a hard look. Can I believe anything she says? he wondered.

"The science guys wanted to use Elly to trank animals in the wild that they wanted to study. It never worked."

"And you got the snake for a pet."

"A bodyguard," Pancho corrected.

"What about the antiserum?"

She laughed. "Saline solution. Just a placebo. The guy would've woke up whether they used it or not."

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Dan broke into a chuckle, too. "Pancho, you're something of a con artist."

"I suppose," she admitted easily.

Amanda's voice came through on the intercom. "I've got an incoming call from La Guaira."

"I'll take it here," Dan said.

It took several frenzied hours, but Dan's PR director finally set up an interactive news conference with reporters from virtually every major media network on Earth, plus Selene's own news director, Edith Elgin, who happened to be Mrs. Douglas Stavenger when she wasn't on the air.

Dan sat back in the little plastic chair in *Starpower*'s wardroom and smiled into the camera of the phone console set into the bulkhead. His PR director acted as moderator, choosing which reporter was allowed to ask a question, and a backup. Dan found that the time lag from the ship to Earth worked in his favor: it gave him time to think before the next question arrived.

It's always smart to think before you talk, he told himself. Engage brain before putting mouth in gear.

THE INTERVIEW

Cable News: Why did you hijack your own ship?

Dan Randolph: How can you call it a hijacking if it's my own ship? And it's only partially mine, by the way. *Starpower 1* is owned by Starpower, Ltd., which in turn is owned by three organizations: Humphries Space Systems, Astro Manufacturing, and the people of Selene. Far as I know, neither Humphries nor Selene is complaining, so I don't see this as a hijacking.

Cable News: But the International Astronautical Authority says you have no right to be aboard *Starpower 1*.

Dan Randolph: Bureaucratic [DELETED]. There's no reason why a human crew can't ride in this vessel. The IAA is just trying to strangle us in red tape.

BBC: Why do you think the IAA refused to give permission for a human crew to fly in your vessel?

Dan Randolph: I'll be double-dipped in hot chocolate fudge if I know. Ask them.

BBC: Surely you have some opinion on the matter.

Dan Randolph: Paper shufflers tend to be conservative souls. There's always a risk in allowing somebody to do something new, and bureaucrats hate risk-taking. Much safer for them to say no, you need more testing or another round of approvals. Buck the responsibility upstairs and don't stick your own neck out. If the IAA had been running America's expansion westward in the nineteenth century, they'd still be trying to decide whether to build Chicago or St. Louis.

Nippon News Agency: What do you hope to achieve by this flight?

Dan Randolph: Ah, a substantive question, for a change. We intend to stake out a claim to one or more asteroids. Our goal is to open up the vast resources of the Asteroid Belt for the human race.

Nippon News Agency: Have you determined which asteroids you will investigate?

Dan Randolph: Yes, but I'm not at liberty to reveal which they are. I don't want anyone or anything to cloud our claim.

Several questioners simultaneously: What do you mean by that? What are you afraid of? Who would make a rival claim?

Dan Randolph: Whoa! Hey, one at a time. Basically, I fear that if I announce that we're aiming for a certain asteroid, the IAA will find a reason to declare it off-limits to development, just as they've declared the Near-Earth Asteroids and the moons of Mars closed to development.

Network Iberia: But the NEAs have been closed to development because there is the chance that their orbits could be perturbed and they would crash into the Earth, isn't that so?

Dan Randolph: That's the IAA's ex-

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cuse for keeping the NEAs off-limits, right. Bureaucrats can always find a good excuse to prevent progress.

Network Iberia: Are you saying, then, that the IAA has other motives in this? A hidden agenda?

Dan Randolph: If they do, their agenda isn't hidden terribly well. They've denied the resources of the NEAs to the needy people of Earth. If they could, they'd deny the resources of the Belt, as well. Why? Ask them, not me.

Lunar News: You seem to be implying that the IAA is working against the best interests of Earth.

Dan Randolph: I'm not implying it, I'm saying it loud and clear: The IAA is working against the best interests of Earth.

Lunar News: If that's the case, who do you think they are working for?

Dan Randolph: The status quo, of course. That's what bureaucrats always support. Their goal is to keep tomorrow exactly like today, or yesterday, even—no matter how lousy today or yesterday may have been.

Pan Asia Informatics: You cast yourself in the position of helping the needy people of Earth. Yet isn't your true goal to make billions in profits for your corporation?

Dan Randolph: My true goal is to open up the resources of the Asteroid Belt. We are running this mission on a shoestring; we don't intend to make a profit from this flight.

Pan Asia Informatics: But you hope to make profits from future missions, don't you?

Dan Randolph: Certainly! But more important than that, we'll have shown that the people of Earth can tap the enormous treasures of resources waiting for us in the Belt. We'll be glad to see other companies coming out to the Belt to find and develop those resources.

Columbia Broadcasting: You'd be glad to see competitors going to the Belt, but only after you yourself have claimed the best asteroids.

Dan Randolph: That's real flatland thinking. There are millions of asteroids in the Belt. Hundreds of millions, if you count the boulder-sized ones. We could claim a thousand of them and that wouldn't even begin to put a dent into the total number available.

Columbia Broadcasting: You say "claim" an asteroid. But isn't it illegal to claim any object in space?

Dan Randolph: It's been illegal since 1967 to claim sovereignty over any body in space. But since the founding of Selene, it has been perfectly legal to claim *use* of the natural resources of a celestial body.

Euronews: Weren't you accused of piracy at one time? Didn't you hijack shipments of ore on their way from the Moon to factories in Earth orbit?

Dan Randolph: That was a long time ago, and all those legal issues have been resolved.

Euronews: But aren't you doing the same thing now? Stealing a ship and going out to claim resources that rightfully belong to the entire human race?

Dan Randolph: Look, pal, I *own* this ship. One-third of it, at least. And those resources out in the Belt won't do the entire human race one diddley-squat [DELETED] iota's worth of good if somebody doesn't go out there and start developing them.

Anzac Supernet: Is it true that *Starpower 1* runs on fusion rockets?

Dan Randolph: Yes. For more about the Duncan Drive you should talk to Lyall Duncan, who headed the team that built this propulsion system. He's at the university in Glasgow.

Anzac Supernet: Are you really going to be able to reach the Asteroid Belt in two weeks?

Dan Randolph: If we accelerate at one-sixth *g* halfway and then decelerate to our destination, yes, two weeks.

Global News: Do you think this stunt will help the price of Astro Manufacturing stock?

Dan Randolph: You must be a stock-

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holder. Yes, if we're successful, I think Astro's price should climb considerably. But that's just my guess. I'm in enough trouble with the IAA; I wouldn't want the GEC's regulators on my back, too.

Global News: How many people are on the ship with you? Could you introduce them?

Leaning back in his reclining chair as he watched the interview, Martin Humphries felt whipsawed by his emotions. Try as he might to remain calm, he seethed inwardly with cold fury at Dan Randolph and Amanda Cunningham.

Yet when Amanda appeared on the wallscreen, sitting at the ship's control panel alongside Pancho Lane, looking properly businesslike in her flight coveralls and her hair pinned up, his anger melted in the light from her eyes.

How could you? he silently asked Amanda. I offered you everything and you turned your back on me. How could you?

After hardly a minute of seeing her onscreen he abruptly snapped the broadcast off. The wallscreen went blank.

It's over and done with, he told himself as he called up his appointments calendar on his desk screen. Put it behind you. Grimly he searched for the date of the next quarterly meeting of Astro Manufacturing's board of directors. He marked the date in red. Randolph will be dead by then. I'll be able to pick his bones and snap up Astro for a song. They'll all be dead by then. Her too.

Furious at the way his hands trembled, Humphries called up his most reliable dating service and began scrolling through the videos of the women who were available and ready to please him.

None of them were as desirable as Amanda, he realized. But he began making his choices anyway.

OUTWARD BOUND

An adenoidal woman lamented lost love as country music twanged softly in the bridge of *Starpower 1*.

"That was some performance you put on," said Pancho.

She was sitting in the command pilot's seat at the instrument panel. Dan was in the right-hand seat, beside her, separated by a bank of control knobs and rocker switches. He saw that half the touchscreens on the panel had been personalized by Pancho: they showed data against backgrounds of the Grand Canyon, sleek acrobatic aircraft, even muscular male models smilingly reclining on sunny beaches.

"The interview?" Dan laughed softly. "I could've predicted three-quarters of the questions they asked. Maybe more."

He stared out at the view through the wide glassteel port that ran the length of the instrument panel and wrapped around its sides. To his left, behind Pancho, was the Sun, its brilliance toned down by the port's heavy tinting but still bright enough to dominate the sky. It made Pancho look as if she had a halo ringing her close-cropped hair. The zodiacal light stretched out from the Sun's middle clear across the width of the port; dust motes scattering the sunlight, leftovers from the solar system's early days of creation. Beyond was darkness, the deep black infinity of space. Only a few of the brightest stars shone through the port's tinting.

"You really think the stock price'll go up?" Pancho asked, her eyes shifting back and forth among the displays on the panel.

"Already has, a couple of points," Dan said. "That's one of the reasons I did the interview."

She nodded. "From what I heard afterward, the IAA wants to slap your butt in jail the instant you get back into their jurisdiction."

"Wouldn't be the first time I've been in jail," Dan muttered.

"Yeah, but that wouldn't do the stock any good, would it?"

"Pancho, you talk like a worried stockholder."

"I *am* a stockholder."

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"Are you worried?"

"What, me worry?" she joked. "I got no time for worryin'. But I would like to know exactly where we're heading."

"Would you?"

"Come on, boss, you can razzle-dazzle the reporters but I know you got an asteroid all picked out. Maybe a couple of 'em."

"I want to get to three of them."

"Three?"

"Yep. One of each type: stony, metallic and carbonaceous."

"How deep into the Belt will we hafta go?"

"We'd better bring Fuchs into this; he's the expert."

In a few minutes the four of them were seated around the table in the ship's wardroom: Amanda and Fuchs on one side, Pancho and Dan on the other. A computer-generated chart of the Asteroid Belt was displayed on the bulkhead screen, a ragged sprinkling of colored dots between thin yellow circles representing the orbits of Mars and Jupiter.

"So you can see that the metallic asteroids," Fuchs was saying, in an almost pedantic drone, "lie mostly in the outer areas of the Belt. This is a region that hasn't been explored as well as the inner zones."

"Which is why we haven't picked a specific metallic rock, as yet," said Dan.

"What're we talkin' here?" Pancho asked. "Three AUs? Four?"

"Four astronomical units," Amanda replied, "give or take a fraction."

"And you want to head out there and scout around?" Pancho clearly looked incredulous.

"We have enough fuel for some maneuvering," Dan said.

Pulling her palmcomp from her coverall pocket, Pancho said, "Some maneuvering. But at that distance, not a helluva lot."

"I need a nice chunk of nickel-iron," Dan said. "Doesn't have to be big: a few hundred meters will do just fine."

Fuchs broke into a smile. It made his heavy-featured, normally dour face light up. "I think I understand. A nickel-iron piece a few hundred meters across would contain enough iron ore to feed the world's steel industry for a year or more."

Dan jabbed a forefinger in his direction. "You've got it, Lars. That's what I want to show them, back home."

Amanda spoke up. "Didn't someone bring a nickel-iron asteroid into the Earth-Moon vicinity?"

"Gunn did it," Fuchs answered. "He even named the asteroid Pittsburgh, after the steel-producing center in the United States."

"Yeah, and the double-damned GEC tossed Gunn off the rock and damned near ruined him," Dan recalled sourly.

"You simply can't have people bringing potentially dangerous objects into the Earth-Moon region," Amanda said. "Suppose this Pittsburgh thing somehow was perturbed into an orbit that would impact Earth? It could have been devastating."

Dan scowled at her. "It's been more than four centuries since Newton figured out the laws of motion and gravity. We can calculate orbits with some precision. Pittsburgh wasn't going to endanger anything. It was just the double-damned GEC's way of maintaining control."

Pancho looked up from her palmcomp. "We've got fuel enough to maneuver for three days, out at the four-AU range."

"Good enough," Dan said. "We'll be scanning all the way out there. Maybe we'll get lucky and find a nickel-iron baby right away."

Fuchs shook his head gloomily. "There is vast emptiness out there." Pointing to the wallscreen display, he went on, "We think of the Belt as crowded with asteroids, but really they are nothing but infinitesimal bits of matter floating in an enormous sea of emptiness. If that chart was drawn to true

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scale, the asteroids would be too small to see, except in a microscope."

"A few needles in a tremendous haystack," Amanda added.

Dan shrugged carelessly. "That's why we have radar and telescopes and all the other sensors."

Pancho brought the conversation back to practicality. "OK, so we have to go huntin' to find a metallic rock. What about the others you want, boss?"

"Lars has already picked them out."

Tapping on his own palmcomp, lying on the table before him, Fuchs highlighted two particular asteroids on the wall display. Bright red circles flashed around them. With another touch of his stylus on the palmcomp's tiny keyboard, the trajectory of *Starpower 1* appeared on the display, with the ship's current position outlined by a flashing yellow circle.

"The closer object is 26-238, an S-type asteroid."

"Stony," Amanda said.

"Yes," Fuchs agreed, smiling at her. "Stony asteroids are rich in silicates and light metals such as magnesium, calcium and aluminum."

Dan stared at the display. The dot showing *Starpower 1*'s position was noticeably moving. Christ, we're going like a bat out of hell. He had known the facts and figures of the fusion-driven ship's performance, but now, seeing the reality of it on the chart, it began to hit him viscerally.

"Our second objective," Fuchs was going on, "will be 32-114, a C-type, chondritic object. Chondritic asteroids contain carbon and hydrates—"

"Water," said Pancho, getting up from the narrow table and heading for the food freezer.

"Yes, water, but not in the liquid form."

"The water molecules are linked chemically to the other molecules in the rock," Amanda said. "You have to apply heat or some other form of energy to get the water out."

"But it's water," Dan said, watching Pancho as she pulled a foil-wrapped prepackaged meal from the freezer. "Selene needs water. So does anybody working in space."

"'You will do your work on water,'" Amanda murmured. "'An' you'll lick the bloomin' boots of 'im that's got it.'"

"What's that?" Dan asked, puzzled.

She looked almost embarrassed. "Oh . . . Kipling. Rudyard Kipling."

"'Gunga Din,'" Fuchs added quickly. "A very fine poem."

"By a white male chauvinist," Pancho quipped as she slid her meal into the microwave oven.

"How can you be hungry?" Amanda asked. "You had a full meal only a few hours ago."

Pancho grinned at her. "I don't have to watch my figure. I burn off the calories just like that." She snapped her fingers.

"But those prepackaged meals," Amanda said. "They're so . . . prepackaged."

"I like 'em," said Pancho.

"Anyway," Dan said, raising his voice slightly to cut off any disagreements, "those are the two rocks we're going after. We'll take some samples to solidify our claim and then head for the outer region of the Belt and find ourselves a metallic body."

"I've been wondering," Amanda said slowly, "about the legal status of any claims we make. If the IAA considers this flight to be illegal . . . I mean, if we're deemed to be outlaws—"

"They could disallow our claims to the asteroids," Dan finished for her. "I've thought about that."

"And?"

A single, sharp, clear *ping* sounded from the open hatch to the bridge. Pancho shot out of her chair and ducked through the hatch.

She came back into the wardroom a moment later, her face taut. "Solar flare."

Amanda got to her feet and pushed past Pancho, into the bridge. Fuchs looked concerned, almost alarmed.

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Dan said, "I'll check out the electron guns."

"Might not hit us," Pancho said. "The plasma cloud's still too far away to know if it'll reach us or not."

"I'll check out the electron guns anyway," Dan said, getting up from his chair. "I've taken enough radiation to last me a lifetime. I don't need any more."

EARTHVIEW RESTAURANT

The instant Martin Humphries saw Kris Cardenas, he realized that she was suffering pangs of guilt. Big time. The scientist looked as if she hadn't slept well recently; dark circles ringed her eyes, her face looked bleak.

He rose from his chair as the maitre d' escorted her to the table and smiled as the dark-clad man held Cardenas' chair for her while she sat down. Cardenas was not smiling.

Gesturing with an outstretched arm, Humphries said, "The finest restaurant within four hundred thousand kilometers."

It was an old joke in Selene. The Earthview was the only true restaurant on the Moon. The other two eateries were cafeterias. Ten years earlier, the Yamagata Corporation had opened a top-grade tourist hotel at Selene, complete with a five-star restaurant. But Yamagata was forced to shut down their restaurant as the greenhouse warming throttled the tourist trade down to a trickle. Now they sent their guests to the Earthview.

At least Cardenas had dressed properly, Humphries saw. She wore a sleeveless forest-green sheath decorated tastefully with accents of gold jewelry. But she looked as if she were ready to attend a funeral, not an elegant dinner.

Without preamble, she leaned across the table so intently she almost touched heads with Humphries. "You've got to warn them," she whispered urgently.

"There's plenty of time for that," he said easily. "Relax and enjoy your meal."

In truth, the Earthview was a fine restaurant by any standard. The staff were mostly young, except for the stiffly formal maitre d', who added an air of grave dignity to the establishment. Carved out of the lunar rock four levels below the surface, the restaurant lived up to its name by having broad, sweeping windowalls that displayed the view from the lunar surface. It was almost like looking through windows at the barren, gauntly beautiful floor of the great ring-walled plain of Alphonsus. The Earth was always in the dark sky, hanging there like a splendid glowing blue and white ornament, ever changing yet always present.

There were no robots in sight at the Earthview restaurant, although the menus and wine list appeared on display screens built into the table tops. Instead of tablecloths, each place setting rested on a small mat of glittering lunar honeycomb metal, as thin and flexible as silk.

Humphries ordered wine from their waiter. As soon as the young man walked away from their table, Cardenas hunched forward again and whispered, "Now! Tell them now! The sooner they know the safer they'll be."

He gave her a hard look. Apparently the nanobugs in her bloodstream can't deal with the effects of too little sleep, he thought. Or maybe she has nightmares. She's on a royal guilt trip, that's certain.

"We agreed, Dr. Cardenas," he said softly, "that we would warn them just as they approached the outer fringes of the Belt. That won't happen for another day and a half."

"I want you to warn them now," she insisted. "I don't care what we agreed on."

With the barest shake of his head, Humphries said, "I'm afraid I can't do that. We must stick to our plan."

"I was insane ever to agree to this," Cardenas hissed.

"But you did agree," Humphries pointed out. "In the long run, you'll be glad that you did."

It had been so easy to turn her.

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Humphries considered that his one major talent was finding the weak spot in other peoples' personalities, and then playing on their weaknesses to get what he wanted. It worked with Dan Randolph and his ridiculous crusade to save the Earth. It worked with Dr. Cardenas and her burning anger against the Earth and the people who had separated her from her husband and family.

The wine came. Humphries tasted it and sent it back. There was nothing really wrong with it, but Humphries simply felt like asserting himself. Subtly. Cardenas probably doesn't understand what's going on, not at the conscious level, he thought. But down in her guts she's got to know that I'm the one in charge here. I make the decisions. I mete out the rewards and the punishments.

She sat in stony silence while the embarrassed waiter took away the wine and swiftly returned with another bottle. Humphries sipped at it. Not as good as the first one, really, but he had established his point.

"This is fine," he murmured. "You may pour."

They ordered dinner. Cardenas barely picked at hers as, course by course, the dishes came and were taken away again. Humphries ate heartily. He was almost enjoying Cardenas' discomfort.

At last, after the waiter had left their desserts and walked away from the table, Cardenas said, "Well, if you won't tell them, I will."

"That's not what we agreed on," Humphries said tightly.

"To hell with what we agreed on! I don't know why I let you talk me into it."

"You let me talk you into it because I can get you back to Earth, back to your ex-husband and your children and grandchildren."

"He's remarried," she said bitterly. "There's no point in messing up his life any more than I have already."

Humphries almost smiled. She's really riding the guilt train, he said to himself.

Aloud, he coaxed, "But your grandchildren. You do want to see them, don't you? If you prefer, I could arrange to have them come up here, you know."

"I've asked them to come up, just for a visit. Begged them," Cardenas said. "They won't do it. They're terrified that they'll be refused re-entry back to Earth. That they'll be exiled here, just as I am."

Smoothly, Humphries said, "I can arrange a visit for them. Outside normal channels. I can guarantee that they'll be allowed to return to their homes."

He saw new hope kindled in her eyes. "You could?"

"No sweat."

She sat in silence while her dessert slowly melted. Humphries spooned his up, watching her, waiting.

"But don't you understand how dangerous it is?" she blurted at last. "They're going out past Mars, for god's sake. There's no one out there to help them."

"Randolph's no fool," he said sharply. "When the ship's systems start to fail he'll turn around and come back here. In a big hurry."

"I don't know . . ."

"And his pilot's an expert. She won't do anything foolish."

Cardenas either wasn't listening to him or not hearing. "Once those nanos kick in," she said, "there's no stopping them. They'll take the radiation shield apart, atom by atom, and then—"

"They won't have the time," Humphries insisted. "You forget how fast *Starpower* goes. They'll zip back here in a few days."

"Still . . ." Cardenas looked utterly unconvinced.

Trying to sound unconcerned, Humphries said, "Look, I know this is a dirty trick to play on Randolph. But that's the business world. I want his mission to fail so I can buy out his company on the cheap. I don't want to kill him! I'm not a murderer."

Not yet, he added silently. But I'm going to be. And I'm going to have to silence this woman before her guilt trip

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makes her warn Randolph.

Unbidden, the thought of Amanda came to him. It only hardened his resolve. *He's* making me kill her. Randolph deserves to die. He's forced me to kill Amanda.

As he looked across the table at Kris Cardenas, so troubled, her eyes focused on god-knows-what, Humphries nodded to himself. If I leave her alone she'll warn Randolph. She'll ruin everything. I can't let her do that.

SOLAR STORM

The Apollo missions to the Moon in the mid-twentieth century were timed to avoid periods when the Sun was likely to erupt with a flare that would drench the solar system with killing levels of hard radiation.

Later, spacecraft shuttling between the Earth and the Moon simply scurried for shelter when a solar storm struck. They either returned to the protection that the Earth's magnetic field provides against the storm's lashing hail of protons and electrons, or they landed on the Moon and their crews sought shelter underground.

The earliest spacecraft to carry humans beyond the Earth-Moon system had no such options available to them, for their transit times to Mars were so long that they would inevitably encounter a solar storm while weeks or months away from a safe haven. Thus they were outfitted with storm shelters, special compartments in which the crew could be protected from the intense radiation spewed out by a solar flare. The first explorers sent to Mars spent days on end cooped up in their spacecraft's cramped "storm cellar," until the high-energy particles of the storm's plasma cloud finally passed them by.

Starpower 1 had no storm cellar. The entire crew module was protected in the same manner that a storm shelter would have been. The module was lined with thin wires of an exotic yttrium-based compound that formed a superconducting magnet which generated a permanent magnetic field around the crew module, a miniature version of the Earth's magnetic field. Yet the superconductor could not produce a magnetic field strong enough to deflect the solar storm's most dangerous killers, the high-energy protons.

When faced with a vast cloud of deadly subatomic particles blasted out by a solar flare, the ship was charged to a high positive electrostatic potential by a pair of electron guns. The energetic protons in the cloud were repelled by the ship's positive charge. The magnetic field was strong enough to deflect the cloud's lighter, less-energetic electrons—and thus keep the negatively-charged electrons from ruining the ship's positive charge.

Safely cocooned inside the protective magnetic field, the crew of *Starpower 1* watched the swift approach of the storm's plasma cloud.

"Be here in another six hours," Pancho announced, pulling off her headset as she swivelled the command pilot's chair to face Dan.

He frowned at the news. "That's for certain?"

"Certain as they can be. Early-warning spacecraft in Mercury co-orbit have plotted out the cloud. Unless there's a great big kink in the interplanetary field, it's gonna roll right over us."

Nodding, Dan said, "The electron guns are ready to go."

"Better start 'em up," she said. "No sense waitin' till the last minute."

"Right." Dan stepped through the hatch, into the empty wardroom, and headed aft, where the electron guns were housed. Pancho could control them from the bridge, but Dan wanted to be there in case any problems cropped up.

"And send Amanda up here, will you?" Pancho called to him. "I gotta take a break."

"Right," Dan shouted back, over his

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shoulder.

Where is Amanda? he asked himself. The wardroom was empty. The doors to the privacy compartments along the passageway were closed. And where is Fuchs? he wondered, starting to feel nettled.

He found them both in the sensor bay, where Fuchs was explaining something about the x-ray projector.

"It would be more helpful if we could use a small nuclear device," the planetary astronomer was saying, totally serious. "That would be the most convenient way of generating x-rays and gamma rays all at the same time. But of course, nuclear devices are banned."

"Of course," Amanda said, looking just as intent as Fuchs.

"Pancho needs you on the bridge, Mandy." Dan said.

She looked startled for a flash of a second, then said, "Right."

As she hurried toward the bridge, Dan asked Fuchs, "What in the name of the nine gods of Sumatra do you want a nuke for?"

"I don't!" Fuchs said. "They're illegal, and justly so."

"But you just said—"

"I was explaining to Amanda about x-ray spectroscopy. How we use x-rays to make an asteroid fluoresce and reveal its chemical composition. The x-rays from this solar flare would have been very helpful to us if we were only close enough to the Belt."

"But a nuke?"

Fuchs spread his hands. "Merely an example of how to produce x-rays and gamma rays on demand. An example only. I have no intention of bringing nuclear explosives into space."

"I don't know," Dan said, scratching his chin. "You might be onto something. Maybe we could talk the IAA into letting us use nukes as sources for spectroscopic studies."

Fuchs looked aghast. Dan laughed and slapped him on the shoulder. Fuchs saw the joke and grinned weakly back.

Dan's mood darkened as he edged down the narrow walkway in the aft end of the module. He did not like the thought of being exposed to hard radiation. He had taken a lifetime's worth of radiation back in his earlier days, working in space. Much more of a dose would kill him, he knew. It wouldn't be an easy way to go, either.

As he lifted the covers protecting the electron guns' innards and checked them for the eleventh time since they'd launched out of lunar orbit, Dan thought, Maybe Stavenger's right. Get a jolt of nanomachines, let them clean up the damage the radiation's done, rebuild me from the inside. So I won't be able to go back to Earth. So what? What's down there that I'd miss so much?

He knew the answer even as he asked the question. Sea breezes. Blue skies and soft sunsets. Birds flying. Flowers. Huge ugly brutal cities teeming with life. Vineyards! Dan suddenly realized that no one had yet tried to grow wine grapes off-Earth. Maybe that's what I'll do when I retire: settle down and watch my vineyards grow.

The intercom speaker set into the narrow walkway's overhead carried Pancho's voice. "Dan, you ready for me to light up the guns?"

The electron guns were just as good as they'd been all the other times he'd inspected them. Closing the cover on the one on his right, Dan answered, "You may fire when ready, Gridley."

Pancho retorted, "I don't know who this Gridley guy is, but I can't rev up the guns till you close both their covers and seal 'em right and proper."

"Aye, aye, skipper," Dan said.

By the time he made it back to the bridge, Pancho was nowhere in sight. Amanda sat alone in the right-hand seat and the bridge was rocking to the beat of high-intensity pop music. As soon as she saw Dan come through the hatch, Amanda snapped the music off.

"Pancho's in the loo," she said as Dan slid into the command pilot's seat.

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"How's the storm?"

"Precisely on track." Amanda tapped at one of her touchscreens; it displayed a simplified map of the inner solar system, the orbits of Earth and Mars shown as thin lines of blue and red, respectively; the position of *Starpower 1* was a blinking bright yellow dot. A lopsided gray miasma was almost touching the dot.

Dan's mouth went dry. "I hate these things," he mumbled.

"It missed the Earth completely. Mars, as well."

"But it's going to swamp us."

"Actually," Amanda said, "we'll merely be brushed by it. A few hours, that's all."

"That's good."

"Our own velocity is helping a lot, you know. An ordinary spacecraft, coasting along the way they do, would be in the cloud for days on end."

Dan had no desire to be in the cloud for even ten minutes. He changed the subject, as much to get away from the fear building up inside him as any other reason. "How friendly are you and Fuchs?"

Amanda's brows shot up. "Lars? He's very earnest—about his work. Nothing more."

"That's all there is to it?"

"Yes."

Dan thought it over. Two healthy young people locked in this sardine can for a couple of weeks. Of course, there's Pancho and me to chaperon them. Dan grinned to himself. Damn, it's like being a teenager's father.

Pancho returned to the bridge. "Hey boss, get outta my chair."

"Yes'm," said Dan.

The plasma cloud hit them less than an hour later. There was no buffeting, no clanging of alarms, nothing to tell them that the were being engulfed in the cloud of killing radiation except the rising curves of fire-engine red on the radiation monitoring screens.

Pancho did not consider the storm so dangerous that someone had to be on the bridge at all times. She came into the wardroom and joined the others for dinner. Dan ate mechanically, not really tasting his food, not really hearing the conversation. Double-damned radiation, he kept thinking. I hate this. Despite two steaming mugs of coffee, he felt cold inside.

But the others seemed completely unfazed by the storm. After the meal Dan said good-night to them all and went to his compartment. He dreamed of floating helplessly in space, slowly freezing as the Sun glowered at him.

NANOTECHNOLOGY LABORATORY

Long past midnight, Kris Cardenas sat alone in her office in Selene's nanotechnology lab. The rest of the lab was empty, darkened to its nighttime lighting level.

She had agreed to have dinner with Martin Humphries because she wanted to get the man to warn Dan Randolph about the nanomachines that she had planted in his vessel, virus-sized disassemblers that once were known as "gobblers."

They were the reason that nanotechnology was banned on Earth—and under careful supervision at Selene.

Quis custodiet ipsos custodes? she asked herself. Who will watch the watchmen? Some Roman asked that question more than two thousand years ago, Cardenas knew.

All nanotech work was under very strict control in Selene. No one was allowed to work with gobblers: they had killed people. They had even been used to commit murder. If they ever got loose they could destroy all Selene. The medical work had to be supervised down to the nanometer because the therapeutic nanobugs that took apart plaque in a person's arteries or destroyed tumors atom by atom were forms of gobblers, nothing less. If they ever got loose, if their programming was ever-so-subtly altered . . .

That was why Kris Cardenas' primary duty as head of all nanotech work at Se-

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lene was to protect against such a catastrophe. She watched over every aspect of the work done in the nanotech lab.

But who will watch the watchmen? She had produced a microscopic batch of gobblers for Humphries, specifically tailored to damage *Starpower 1* enough so Dan would have to turn the ship around and limp back to Selene. Humphries had promised that he would obtain permission for her to visit Earth again, to see her daughters and her grandchildren.

Now he was offering to bring them up here. Even better. But the price! Dan Randolph and the other people on that ship could get killed.

Is that what Humphries really wants? she asked herself. If I warned Dan now he'd have to return to Selene. Flat and simple. But Humphries wants to wait another day or so, let Dan get to the inner fringes of the Belt and then tell him that his ship's going to fail.

Or maybe he won't warn Dan at all!

Cardenas sat up straight in her desk chair. That's it, she told herself. He wants to kill Dan and the rest of the crew. She knew it with the certainty of revealed truth.

What can I do about it?

Warn Dan, she answered her own question. Warn him *now*.

But how? she wondered. I can't just pick up a phone and put a call through to him. They're out past the orbit of Mars by now.

I've got to get to someone in the Astro office. Someone who can put me through to Dan. Maybe that big Australian bodyguard of his. What's his name? George something.

Martin Humphries could not sleep, despite the exertions he'd been through with the raven-haired woman lying beside him. Nominally an environmentalist on the consulting staff of Humphries Trust, the young woman's favored environment seemed to be a bedroom with plenty of furniture to play on, as far as Humphries could determine.

She was sleeping peacefully. He was wide awake.

Dr. Cardenas. Humphries was worried about her. Even the lure of seeing her grandchildren wasn't going to outweigh her overdeveloped sense of honor, he thought. She wants to warn Randolph; she's probably figured out that I want the sonofabitch dead.

He sat up in the bed and glanced at the woman sleeping beside him. Slowly, carefully, he pulled the silk sheet down from her shoulders. Even with no lights in the room except the green glow from the digital clock, he could see that her body was smooth, flawless, perfectly proportioned. Too bad she's heading back to Earth in a few days.

Cardenas, he reminded himself sternly.

She's going to try to warn Randolph, he felt certain. Maybe that's a good thing. If Randolph turns back now, Amanda will come back with him. With *him*. She won't be coming back to me. She doesn't want me, that's why she ran off with him. If Cardenas warns them, they'll come back here together to gloat at me.

He squeezed his eyes shut and tried to drive out the mental images of Randolph and Amanda together. I've got to think this through carefully. Logically.

For Cardenas to warn Randolph she'll have to get somebody here in Selene to set up the message for her. She'll probably go to Astro; that's where Randolph's people are. And if she asks them to let her put through a call to Randolph they'll ask her why. Sooner or later she'll tell them why: Martin Humphries has bugged the *Starpower* ship with nanomachines. And then they'll know all about it.

Conclusion: For my own protection, I've got to stop her from talking to anyone at Astro. I've got to stop her from even trying to warn Randolph. I've got to stop her. Period.

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When Dan awoke from his troubled sleep, the solar storm had passed. Pancho was in the wardroom when he shambled in, bleary-eyed.

"Top o' the mornin', boss," she said cheerily, hefting a mug of steaming coffee.

"How's the weather out there?" Dan asked, heading for the juice dispenser.

"Clear and calm, except for a few rocks we should be passin' by this afternoon."

That made Dan smile. "We're at the Belt."

"Will be, by sixteen hundred hours. Right on *shedyule*, as Mandy would say."

"Good. Great. Where's Fuchs? We've got to make some course adjustments."

Ten minutes later the four of them were seated around the table in the wardroom.

"I want to get a metallic nugget first," Dan said. Fuchs lifted his heavy shoulders slightly. "The metallic bodies are more heavily concentrated towards the outer area of the Belt."

"So we go to the outer edge of the Belt," Dan replied, "and search for a lump of iron. We can pick up the stony and carbonaceous rocks on the way back."

"We'll have to go more than four astronomical units, then," Amanda pointed out. "No one's gone that far before."

Dan said, "We've got the supplies for it. And the fuel. Everything's running all right, isn't it?"

"No major problems," said Pancho.

His brows rising, Dan asked, "What are the minor problems?"

She grinned at him. "The coffee's pretty awful. A couple of li'l maintenance chores to do. You know, a cranky pump, one of the fuel cells is discharging when it shouldn't. Nigglin' stuff. Mandy and I are takin' care of it."

Amanda nodded. Dan looked from her back to Pancho. Neither woman seemed worried. Well, he thought, if the pilots aren't worried, no reason for me to sweat.

"The sensor suite is in perfect working order," Fuchs volunteered. "I'm already recording data."

"We'll have to do the turnaround maneuver soon," said Amanda.

Gesturing vaguely toward infinity, Dan asked Fuchs, "Have you picked a destination point out there?"

"A general area only," he replied. "The outer Belt has not been mapped well enough to pick a precise asteroid. Most of them are not even numbered yet."

"Have you given Pancho the coordinates?"

Fuchs' face colored slightly. "I gave them to Amanda."

"I've put the data into the nav computer," Amanda said quickly, looking at Pancho.

Pancho nodded. "OK. I'll go check it out."

"Onward and upward," said Dan, rising from his chair. "We'll be breaking distance records, if nothing else."

"Four AUs," Pancho muttered, getting to her feet also.

She headed for the bridge. Dan followed her, leaving Amanda and Fuchs still sitting at the table.

Pancho slid into the pilot's chair and tapped on her main touchscreen, the one showing the hunk on the beach. Standing behind her, Dan saw the navigation computer program come up over the muscles and teeth.

But Pancho was looking at one of the smaller screens, where an amber light was blinking slowly.

"What's that?" Dan asked.

"Dunno," said Pancho, working the screen with her fingers. "Running a diagnostic . . . h'mmph."

"What?"

Without turning her head from the display screens, Pancho muttered, "Says there's a hot spot on one of the superconducting wires outside."

A jolt of alarm surged through Dan. "The superconductor? Our storm shield?"

She glanced up at him. "Don't get fraz-

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zled, boss. Happens all the time. Might be a pinhole leak in the coolant line. Maybe a micrometeor dinged us."

"But if the coolant goes—"

"The rate of loss ain't much," Pancho said calmly. "We're due for turnaround in six hours. I can angle the ship then so's that side's in the shade. If the hot spot doesn't go away then, Mandy and me will go EVA and fix the leak."

Dan nodded and tried to feel reassured.

STAVENGER THEATER

Kris Cardenas marvelled at the crowd's willingness to leave their comfortable homes and jam themselves cheek-by-jowl into the cramped rows of narrow seats of the outdoor theater.

Even with three-dimensional interactive video and virtual reality programs that were nearly indistinguishable from actuality, people still went to live performances. Maybe it's because we're mammals, Cardenas thought. We crave the warmth of other mammals. We're born to it and we're stuck with it. Lizards have a better deal.

A considerable crowd of people was flowing into the theater. It was built in the Grand Plaza, "outdoors." Exactly one thousand seats were set in a shallow arc around the graceful fluted shell that backed the stage.

There was one particular mammal Cardenas wanted to see: George Ambrose. That morning she had phoned the Astro corporate office trying to find him, only to reach his video mail. Late in the afternoon he returned her call. When she said she had to talk to him in person as soon as possible, and preferably in a public place, George had scratched at his thick red beard for a moment and then suggested the theater.

"I've got a date comin' with me," he said cheerfully, "but we can get together in the intermission and chat for a bit. OK?"

Cardenas had quickly agreed. Only as an afterthought did she ask what the theater was playing.

George sighed heavily. "Some fookin' Greek tragedy. This date of mine, she's a nut for th' classics."

Usually the theater was sold out, no matter what the production might be. In the days before the greenhouse cliff, when tourism was building up nicely, Selene's management invited world-class symphony orchestras, dance troupes, and drama companies to come to the Moon. Now, most of the performances were done by local amateur talent.

Medea, performed by Selene's very own Alphonsus Players. Cardenas would have shuddered, if it had mattered to her at all. Still, the theater was fully booked. Only Cardenas' status as one of Selene's leading citizens wheedled a ticket out of the system, and she had to go all the way up to Doug Stavenger for that. He smilingly admitted that he wasn't going to use his.

She barely looked at the stage during the first half of the performance. Sitting on the aisle in the fourth row, Cardenas spent most of her time scanning the crowd for a glimpse of George Ambrose's shaggy red hair.

When the first half ended, she trudged with the slow-moving throng along the central aisle as they chatted about the play and the performances. Cardenas felt surprised to see so many gray and white heads in the theatergoers. Selene is aging, she thought. And very few of our people are taking nano bugs or other therapies to stop it. Finally she saw Big George, like a fiery beacon bobbing head and shoulders above the others.

Once past the last row of seats, most of the crowd scattered to the concession stands spread among the plaza's flowering shrubbery. A maintenance robot trundled slowly along the periphery of the crowd, patrolling for litter.

George was at the jam-packed bar. Cardenas hung back, waiting for him to get his drink and work his way out of the crowd. When he did, he had a plastic

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stein of beer decorated with Selene's logo in one hand and a skinny, hollow-eyed redhead on his other arm. She was pretty, in a gaunt, needy way, Cardenas thought. Nice legs. The drink in her hand was much smaller than Ambrose's.

Big George spotted Cardenas and, leaving his date standing by a flowering hibiscus bush, walked toward her.

"Dr. Cardenas," he said, with a polite dip of his head. "What can I do for you?"

"I've got to get a message to Dan Randolph," she said. "As quickly as possible."

"No worries. Pop over t' the office tomorrow morning. Or tonight, after th' show, if you like."

"Is there some way I could talk to Dan without coming to your offices? I think I'm being watched."

George looked more puzzled than alarmed. "You could phone me, I suppose, and I'll patch you through to the radio link." He took a pull from his stein.

"Can we do it tonight?"

"Sure. Right now, if you like. I wouldn't mind an excuse to leave this show. Pretty fookin' dull, dontcha think?"

"Not now," she answered. "That would attract attention. After the show. I'll drop in at a friend's place and call your office from there."

For the first time, George showed concern. "You're really scared, are you?"

"I think Dan's life is in danger."

"You mean someone's out to kill 'im?"

"Humphries."

George's face hardened. "You certain of that?"

"I'm . . . pretty sure."

"Sure enough to want to warn Dan. From a safe place, where the phone won't be bugged."

"Exactly."

George took a big breath. "All right. Instead of all this pussyfootin' around, you come with me after the show's finished and I'll put you up in an Astro guest suite. That way I can protect you."

Cardenas shook her head. "That's kind of you, but I don't think I'm in danger."

"Then why th' cloak and dagger stuff?"

"I don't want Humphries to know that I'm warning Dan. If he knew, then maybe I would be in trouble."

George thought that over for a few moments, a huge red-maned mountain of a man towering over her, scratching his head perplexedly.

"All right," he said at last. "Back to Plan A, then. I'll go to th' office after this fookin' show and you call me there. OK?"

"Yes. Fine. Thank you."

"Sure you don't want some protection?"

She considered his offer for several heartbeats, then said, "Thanks, but I won't need it. And I've got my work to consider. I can't run the lab from an Astro guest suite."

"OK," said George. "But if you change your mind, just holler."

Martin Humphries was reclining in his favorite chair, watching a home video of his own performance when the phone buzzed. Irked, he glanced at the console and saw that it was his emergency line. He snapped his fingers and the wallscreen lit up to show the woman he'd sent to follow Cardenas. She was a nondescript clerk from Astro Corporation's communications department who needed extra money to bring her younger sister up from the ravaged ruins of Moldavia.

"Well?" Humphries demanded.

"She talked with George Ambrose and then went back to the show."

"You have video?"

"Yes, of course."

"Well, let me see it," he snapped.

The woman's face was replaced by a slightly jittery video of Cardenas talking earnestly with Randolph's bodyguard, that big Australian.

"They went back to the show together?"

The woman's face reappeared on the

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screen. "No, separately. He had another woman with him."

Glancing at the digital clock on his desk, Humphries asked, "When does the show end?"

"I don't know."

Stupid cow, he fumed silently. Aloud, he commanded, "Stay with her. I'm going to send a couple of men to pick her up. Keep your phone on and they'll home in on the signal. That way, even if they don't get there before the show's over they can find you—and her."

"It is not allowed to keep the phone on during the performance," the woman replied.

"I don't care what's allowed and what isn't! Keep your phone on and stay with Dr. Cardenas or I'll have you shipped back to Moldavia!"

Her eyes widened with sudden fear. "Yes, sir," she said. Sullenly.

"How's the leak?" Dan asked.

He'd been fidgeting around in the wardroom for hours, trying not to pop into the bridge and bother the pilots. But a leak in the superconductor's coolant scared Dan. Without the superconductor, they could be fried by the next solar storm.

So when Amanda left the bridge, Dan asked about the leak.

She looked surprised at his question. "Leak?"

"In the coolant line."

"Oh, that. It's nothing much. Pancho will go EVA after turnaround and patch it."

"Just Pancho?" Dan asked. "By herself?"

"It's only a tiny leak," Amanda said lightly. "Pancho decided it won't need both of us out there."

Dan nodded and got up from his chair. "Think I'll go aft and see what Fuchs is getting." If I just sit here I'll turn myself into a nervous wreck, he added silently.

Fuchs was back in the sensor bay, humming tunelessly to himself as he bent over a worktable strewn with parts from an infrared scanner.

"Did it break down?" Dan asked.

Fuchs looked up at him, a pleased smile on his broad face. "No, no," he said. "I decided to upgrade its sensitivity so we could get better data at long range."

"We're going to turn around soon. You'll have to get all these loose parts stowed away safely or they'll slide off the table."

"Oh, I should be finished by then."

"Really?"

With a glance that was part surprise at having his word questioned, and part pride in his abilities, Fuchs said, "Of course."

He bent over his work again, stubby thick fingers handling the delicate parts with the precision of a well-trained mechanic. Dan watched him for a while, then quietly left the man to himself. As he headed back to his privacy cubicle, he saw Amanda heading along the narrow passage toward him.

"Going to suit up?" he asked. "I can help—"

"Oh, there's plenty of time for that," Amanda said brightly. "I thought I'd pop in on Lars for a few minutes and help him get prepared for turnaround."

Dan felt his brows inch upward. "Something going on between you two?" he asked.

She looked genuinely surprised. "Lars is a complete gentleman," Amanda said with great dignity. "And even though you may not believe it, I know how to behave like a lady."

She brushed past Dan, chin high, radiating disdain.

Dan grinned at her retreating back. Something's going on, all right, even if Fuchs doesn't know it yet.

TURNAROUND

"On my mark," Pancho's voice came through the intercom, "turnaround in thirty minutes. *Mark.*"

Dan sat up in his bunk. He had just drifted to sleep, it seemed, after staring

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at the compartment's overhead for what had felt like hours.

We're well inside the Belt, he thought. The ship's working fine. We're heading for the outer reaches to scout around for a good, solid m-type body.

And there's a leak in the coolant that keeps the superconductor cooled down enough to keep the magnetic field around us that protects us from the hard radiation of solar storms. Sounds like the house that Jack built, he said to himself, trying to shake the feeling of foreboding that plagued him.

He grabbed a fresh pair of coveralls and marched to the lav. I need a shower and a shave, he thought. And you need to get that leak fixed, a voice in his head reminded.

He wished it didn't bother him so much. Pancho wasn't worried about it; neither was Amanda.

Damned good-looking woman, Amanda, he thought. Even in loose-fitting coveralls she's dynamite. Better make it a cold shower.

The only tricky part of the turnaround maneuver was that they had to shut down the main thrusters. Not the fusion reactor itself; the procedure was to kill the ship's thrust during turnaround and use the reactor's exhaust gases to turn the ship by venting the exhaust through maneuvering jets set into the sides of the propulsion module.

Dan headed up to the bridge after his shower. Both pilots were in their places. No music was playing.

"All systems ready for turnaround," Amanda murmured.

"Check. All systems go," Pancho replied.

Standing behind their chairs, Dan asked, "Where's Fuchs?"

"Prob'ly still in the sensor bay," Pancho said, "playin' with his toys."

Amanda frowned slightly as she touched the comm screen. "Turnaround in five minutes," she announced.

Glancing over her shoulder, Pancho said, "Boss, you oughtta find a chair."

He scowled at her. "I've been in micro-g before, kid." Before you were born, he almost added.

He could see Pancho grinning in her reflection on the port in front of her. "OK, you're the boss. Footloops on the deck and handgrips on the overhead."

"Aye-aye, skipper," Dan said, grinning back at her.

"Thrust cutoff in two minutes," Amanda called out.

"Two minutes. Check."

When the main thrusters cut off, Dan felt completely at ease. The feeling of gravity dwindled away to nothing and he floated off the deck slightly. Grabbing one of the handgrips, he hung there and watched the pilots working their touchscreens.

"How's Fuchs doin' back there?" Pancho asked.

Amanda tapped the central screen and it showed Fuchs strapped into the fold-up chair in the sensor bay, looking a little pasty-faced but otherwise OK.

"Maneuver thrust in two minutes," Amanda said.

"Check," Pancho replied.

Dan worked his feet into the loops on the deck without letting go of the overhead handgrips. The maneuvering jets fired and he felt as if somebody suddenly shoved him from one side. He remembered from childhood his first ride in a people-mover at some airport: he'd been standing facing the doors, and when the train lurched into movement he'd nearly toppled over sideways. Only the grownups crowded around him had prevented him from falling.

"Phew," Pancho said, "this bird turns like a supertanker: slow and ugly."

"You're not flying a little flitter now," Dan said.

"Turn rate is on the curve," Amanda pointed out, tracing the curve on the touchscreen with a manicured fingertip. Her screen's background showed the white cliffs of Dover.

"Uh-huh," said Pancho. "Still feels like we're pushin' freight."

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Amanda said, "We are: all that deuterium and helium-three."

The fuel weighs a lot, Dan realized. Funny. You think of hydrogen and helium as being light, almost weightless. But we've got tons of the stuff in our tanks. Dozens of tons.

There was nothing much to see through the port. No panoply of stars swinging past. No asteroids in sight. Nothing but emptiness.

"Where's the Sun?" Dan heard himself ask.

Pancho chuckled. "It's there, boss. Hasn't gone away. We're just angled up too much to see it through the windshield, that's all."

As if in confirmation, a stream of light glowed through the port.

"Sunrise in the swamp," Pancho called out.

Dan felt another sideways surge of thrust, pushing from the opposite direction.

"Turnaround maneuver complete," said Amanda.

"Flow to main thrusters," Pancho said, working the touchscreens.

"Main thrusters, confirmed."

Weight returned to the bridge. Dan settled back onto the deck.

Amanda smiled happily. "On course and on velocity vector."

"Hot spit!" Pancho exclaimed. "Now let's see how that leak is doin'."

Kris Cardenas almost made it back to her own apartment before the two young men in dark business suits caught up with her.

"Dr. Cardenas?"

She turned. The man who had called her name was taller than his partner, slim and lithe, sallow complexion, his dark hair cropped into a buzz cut. The other was huskier, blond, pink-cheeked.

"Come with us, please," said the dark one.

"Where? Why? Who are you?"

"Mr. Humphries wants to see you."

"Now? At this hour? It's—"

"Please," said the blond, slipping a dead-black pistol from inside his jacket.

"It fires tranquilizing darts," said the dark one. "But you wake up with a bitching headache. Don't make us use it on you."

Cardenas looked up and down the corridor. The only other person in sight was a mousy little woman who immediately turned away and started walking in the opposite direction.

"Now," said the blond, pointing his pistol at her.

With a resigned droop of her shoulders, Cardenas nodded her surrender. The blond put his gun away and they started along the corridor toward the escalators.

"At least this one doesn't have a snake," the blond whispered hoarsely to his partner.

The other man did not laugh.

EVA

Pancho felt an old excitement bubbling up inside her as she wormed her arms through the spacesuit's sleeves. After more than five days of being cooped up in the ship, she was going outside. It was like being a kid in school when the recess bell rang.

Standing by the inner airlock hatch, where the spacesuits were stored, she popped her head up through her suit torso's neck ring, grinning happily to herself. This is gonna be fun, she thought.

Dan looked uptight, though, as he held her helmet in his arms and watched her pull on the gloves and seal them to the suit's cuffs.

"Jealous?" she teased.

"Worried," he replied. "I don't like the idea of you going out alone."

"Piece of cake, boss," Pancho said.

"I ought to go with you. Or Amanda, maybe."

With a shake of her head, Pancho countered, "Mandy's gotta stay at the controls. Shouldn't have both pilots out at the same time, if you can help it."

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"Then I'll suit up—"

"Whoa! I've seen your medical record, boss. No outside work for you."

"The safety regs say EVAs should be performed by two astronauts—"

"Whenever possible," Pancho finished for him. "And since when did you start quotin' IAA regulations?"

"Safety is important," Dan said.

Inside the spacesuit, with its hard-shell torso and servomotor-amplified gloves, Pancho felt like some superhero out of a kids' video confronting a mere mortal.

"I'll be fine," she said as she took the helmet from Dan's hands. "Nothin' to worry about."

"But if you run into trouble . . ."

"Tell you what, boss. You suit up and hang out here at the airlock. If I run into trouble you can come on out and save my butt. How's that?"

He brightened. "OK. Good idea."

They called Amanda down from the bridge as Dan struggled into the lower half of his suit and tugged on the boots. By the time he was completely suited up, backpack and all, except for the helmet, Pancho was feeling antsy.

"OK," she said as she pulled the bubble helmet over her head and sealed it to the neck ring. "I'm ready to go outside."

Amanda hurried back to the bridge while Dan stood there grinning lopsidedly at her, his head sticking out of the hard suit like some kid posing for a photograph from behind a cardboard cutout of an astronaut.

Pancho opened the inner hatch of the airlock and stepped through. The airlock was roomier than most, big enough to take two spacesuited people at a time. Through her helmet she heard the pump start to clatter, saw the telltale on the control panel switch from green to amber. The sound dwindled to nothing more than a slight vibration she felt through her boots as the air was pumped out of the chamber. The light flicked to red.

"Ready to open outer hatch," she said, unconsciously lapsing into the clipped argot of flight controllers and pilots.

Amanda's voice came through the tiny speaker set into her neck ring, "Open outer hatch."

The hatch slid up and Pancho stared out at an infinite black emptiness. The helmet's glassteel was heavily tinted, but within a few seconds her eyes adjusted and she could see dozens of stars, then hundreds, thousands of them staring solemnly at her, spangling the heavens with their glory. Off to her left the bright haze of the zodiacal light stretched like a thin arm across the sky.

She turned her back to the light's glow and attached her safety tether to one of the rungs just outside the hatch.

"Goin' out," she said.

"Proceed," Amanda replied.

"Gimme the location of the leak," Pancho said as she clambered out and made her way up the handgrips set into the crew module's side.

"On your screen."

She peered at the tiny video screen strapped to her left wrist. It showed a schematic of the module's superconducting network of wires, with a pulsating red circle where the leak was.

"Got it."

Although she knew the ship was under acceleration and not in zero-g, Pancho still felt surprised that she actually had to climb along the handgrips, like climbing up a ladder, toward the spot marked on the schematic. Deep in her guts she had expected to float along weightlessly.

"OK, I'm there," she said at last.

"Tether yourself," Dan's voice commanded sternly.

Pancho was still tethered to the rung next to the airlock hatch. Grinning at Dan's fretfulness, she unreeled the auxiliary tether from her equipment belt and clipped it to the closest grip.

"I'm all tucked in, Daddy," she quipped.

Now to find the leak, she thought. She bent close and played her helmet lamp

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on the module's skin. The curving metal was threaded with thin wires running along the module's long axis. There was no obvious sign of damage: no charred spot where a micrometeor might have hit, no minigeyser of escaping nitrogen gas.

It can't be more than a pinhole leak, Pancho told herself.

"Am I at the right spot?" she asked.

No answer for a few moments. Then Amanda replied, "Put your beacon on the wire you're looking at, please."

The radio beacon was strapped to Pancho's right wrist. She laid her right forearm on the wire.

"How's that?"

"You're at the proper spot."

"Can't see any damage."

"Replace that section and bring it in for inspection, then."

She nodded inside her helmet. "Will do."

But she felt silly, cutting out what looked to be a perfectly good length of wire. Something's wonky here, Pancho thought. This ain't what we think it is, I bet.

Behind his unkempt beard, Big George was frowning with worry as he sat at one of the consoles in the spaceport's control center. This little cluster of desks was occupied by Astro employees, monitoring *Starpower 1*'s flight. They sat apart from the regular Selene controllers, who handled the traffic to and from Earth.

George wanted to send his message to Dan in complete privacy. The best the Astro controllers could do was to hand him a headset and tell him to keep his voice down.

Wishing they had worked out a code before Dan had impetuously sailed off, George pulled the pin mike to his lips and said hurriedly, "Dan, it's George. Dr. Cardenas has disappeared. She told me last night she was worried that Humphries wants to kill you. When I called her this morning, she wasn't in her office or in her quarters. I can't find her anywhere. I haven't told Selene security about it yet. What do you want me to do?"

He pulled off the headset and nudged the controller who had given it to him. The man had been studiously keeping his back to George.

He swivelled his chair to face the Aussie. "Finished so soon?"

"How long will it take to get an answer?"

The controller tapped at his keyboard and squinted at the display on his console's central screen. "Seventeen minutes and forty-two seconds for your message to reach them. Same amount of time for their answer to get back here, plus a couple additional seconds. They're moving pretty damned fast."

"Thirty-five minutes," George said.

"Got to allow some time for them to hear what you've got to say and decide what to say back to you. Probably an hour, at least."

"I'll wait."

Martin Humphries unconsciously licked at the thin sheen of perspiration beading his upper lip. He hated talking with his crotchety sour-faced father, especially when he had to ask the old man for advice.

"You kidnapped her?" W. Wilson Humphries' wrinkled face looked absolutely astonished. "A Nobel Prize scientist? You kidnapped her?"

"I've brought her here, to my home," Humphries said, holding himself rigidly erect in his chair, exerting every gram of willpower he possessed to keep from squirming. "I couldn't let her warn Randolph."

The conversation between father and son was being carried by a tight laser beam, directly from Humphries Space System's communication center on the top of Alphonsus crater's ringwall mountains to the roof of the senior Humphries' estate in Connecticut. No one could eavesdrop unless they tapped

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into the laser beam itself, and if someone did, the drop in the beam's output at the receiver would be detectable.

"Killing Randolph isn't bad enough," grumbled the old man. "Now you're going to have to kill her, too."

"I haven't killed anybody," Humphries said tightly. "If Randolph has any brains at all he'll turn back."

It took nearly three seconds for his father's reply to reach him. "Sloppy work. If you want to remove him, you should have done it right."

Humphries' temper flared. "I'm not a homicidal maniac! Randolph is business, and anyway, if he dies it will look like an accident. His ship fails out there in the Belt and he and his crew are killed. Nobody will know what happened and nobody will be able to investigate, not for months, maybe years."

He tried to calm himself as he waited for his father's response.

"Gaining Astro Manufacturing is worth the risk," the old man agreed. "Especially since no one can connect you with the . . . uh, accident."

"She can."

Humphries knew what his father was going to say.

"Then you'll have to get rid of her."

"But that doesn't mean I have to kill her. I don't want to do that. She's a valuable asset. We can use her."

It wasn't a spur-of-the-moment decision, Humphries told himself. Dr. Cardenas and her knowledge of nanotechnology had been part of his long-range plan all along. It's just that this crisis has forced me to move faster than I'd originally planned to, he told himself.

"Use her?" his father snapped. "How?"

Waving a hand in the air, Humphries said vaguely, "Nanotechnology. She's the top expert. Without her, it would've taken years to build that fusion rocket."

His father cackled. "You don't have the guts to take her out."

"Don't be an idiot, Dad! She's much more valuable to me alive than dead."

"You want her to be part of your team, then," his father replied.

"Yes, of course. But she's having this goddamned attack of integrity. She's got cold feet about Randolph, and if I don't stop her, she'll tell everyone about the sabotage, even though she's a party to it."

The old man chuckled when he heard his son's complaint. "An attack of integrity, eh? Well, there are ways to get around that."

"How?"

It was maddening to have to wait nearly three seconds for his father's response.

"Make her an offer that she can't accept."

"What?"

Again the interminable wait. Then, "Offer her something that she really wants, but can't agree to. Make her an offer that really tempts her, but she'll have to reject. Then you've shown yourself to be reasonable, and she's being the difficult one. Then she'll be more willing to agree to your next offer."

Humphries was impressed. "That's . . . Machiavellian."

When his father answered, his seamed, sagging face was strangely contorted, as if he were suppressing a guffaw. "Yes, it is, isn't it? And it works."

Humphries could only sit there and admire the old bastard.

More thoughtfully, his father asked, "What's her weak point? What does Cardenas want that she can't get unless you give it to her?"

"Her grandchildren. They'll be our hostages. Oh, I'll do it in a nice, elegant manner. But I'll let her know that either she works for me or her grandchildren suffer. She'll do what I want."

"You really want to be emperor of the world, don't you, Martin?"

Humphries blanched. "*Your* world? God forbid. Earth is a shambles and it isn't going to get any better. You can have it. You're welcome to it. If I make myself emperor, it'll be up here: Selene, the Moon, the asteroids. That's where the

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power is. That's where the future lies. I'll be emperor of these worlds, all right. Gladly!"

For long moments his father said nothing. At last the old man muttered, "God help us all."

STARPOWER 1

Lars Fuchs was scowling as he peered at the display screen.

"Well?" Dan prompted.

The two men stood in the cramped sensor bay, where Fuchs had rigged a makeshift laboratory by yanking one of the ship's mass spectrometers from its mounting and putting it on the repair bench where he was using it to examine the sample of dull gray wire that Pancho had brought in. A thin sky-blue coolant tube lay alongside the wire. Dan knew the wire had originally run through the tube, like an arm in a sleeve.

"There is no leak in the coolant line," Fuchs said. "I drove pressurized nitrogen through it and it didn't leak."

Dan felt puzzled. "Then what's causing the hot spot?"

Pointing to the tangle of curves displayed on the screen, Fuchs said, "The composition of the wire seems to match the specifications quite closely: yttrium, barium, copper, oxygen—all the elements are in their proper proportions."

"That doesn't tell us diddley-squat," Dan groused.

Fuchs' frown deepened as he studied the display. "The copper level seems slightly low."

"Low?"

"That might be a manufacturing defect. Perhaps that's the reason for the problem."

"But there's no leak?"

Fuchs rubbed his broad, square chin. "None that I can detect with this equipment. Really, we don't have the proper equipment for diagnosing this. We would need a much more powerful microscope and—"

"Dan, we're receiving a call for you," Amanda's voice came through the speaker in the sensor bay's overhead. "It's from George Ambrose, marked urgent and confidential."

"I'd better get back up to the bridge," Dan said. "Do the best you can, Lars, with what you've got."

Fuchs nodded unhappily. How can a man accomplish anything without the proper tools? he asked himself. With a heavy sigh, he turned back to the display screen while Randolph ducked through the hatch and headed forward.

What other sensors can I take from the set we have to examine this bit of wire? Everything we have here has been designed to measure gross chemical composition of asteroids, not fine details of a snippet of superconducting wire.

With nothing better that he could think of, Fuchs fired up the mass spectrometer again and took another sampling of the wire's composition. When the curves took shape on the display screen, his eyes went wide with surprised disbelief.

George held one meaty hand over the earphone clamped to the side of his head, listening intently to Dan Randolph's tense, urgent voice. There was no video transmission; Dan had sent audio only.

"... you go with Blyleven to Stavenger himself and tell him what's happened. Stavenger can bypass a lot of red tape and get Selene's security people to turn the place upside down. You can't hide much in a closed community like Selene. A really thorough search will find Dr. Cardenas ... or her body."

George nodded unconsciously as he listened. Once, ten years earlier, he had lived as a fugitive on the fringes of Selene, an outcast among other outcasts who called themselves the Lunar Underground. But they had survived principally on the sufferance of Selene's "straight" community. They could exist on the fringes because nobody cared about them, as long as they didn't make nuisances of themselves.

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George agreed with Dan, up to a point. If Selene's security cops wanted to find a person, there wasn't much chance of hiding. But a dead body could be toted outside, concealed in a tractor, and dumped in the barren wilderness of the Moon's airless surface.

"OK, Dan," he half-whispered into the pin mike at his lips. "I'll get to Stavenger and we'll find Dr. Cardenas, unless she's already dead."

Frank Blyleven was head of Astro corporate security.

A round, florid-faced, jovial-looking man with thinning straw-colored hair that he wore down to his collar, Blyleven seemed to have a grandfatherly smile etched permanently on his face. It unnerved George to see the security director smiling as he explained about Dr. Cardenas' disappearance.

"This is way out of our league," he said, without the slightest change in expression. "I mean, I only have half a dozen people in my group. We chase down industrial espionage and petty theft, for the lord's sweet sake, not kidnappings."

George knew how well Astro's security team chased down petty theft. The Lunar Underground lived on small "borrowings" from corporate storerooms.

"Dan said we should go to Stavenger," said George.

Nodding cheerfully, Blyleven turned to his desktop phone and asked for Douglas Stavenger.

When George and Blyleven were ushered into Stavenger's office, up in the Grand Plaza, a fourth man was sitting in front of Stavenger's broad, glistening desk. Stavenger introduced him as Ulrick Maas, director of security for Selene. Maas looked like a real cop to George: muscular build, dark, suspicious eyes, scalp shaved bald.

"You realize that this may be nothing to get alarmed about," Stavenger said once all four men were seated. "But Kris Cardenas isn't the kind of woman who suddenly goes into hiding, so I think we ought to try to find her."

"She's in Humphries' place, down at the bottom level," George said flatly.

Stavenger leaned back in his desk chair. Maas stared at George through narrowed eyes; Blyleven looked as if he were thinking about much more pleasant things. Through the office windows George could see the broad expanse of the Grand Plaza. A couple of kids were flying above the greenspace like a pair of birds, flapping their brightly-colored rented plastic wings.

Grimacing, Stavenger asked, "You're certain of that?"

"It's Humphries she was scared of," George replied. "Where else would he stash her?"

"That area down there is the property of the Humphries Trust," Maas pointed out. "Selene doesn't have legal authority to go in and search it."

"Not even if her life's on the line?" George asked.

Stavenger said to Maas, "Rick, I think you'll have to initiate a search."

"Of Humphries' place?" George asked.

"Of all of Selene proper," Stavenger said. "Humphries' place is a different matter." He turned to the phone and asked it to connect him with Martin Humphries.

"Dr. Cardenas?" Martin Humphries said to Stavenger's image on his patio wallscreen. "You mean the scientist?"

"Yes," said Stavenger, looking strained. "She's missing."

Humphries got up from the chaise lounge on which he'd been reclining while he reviewed his father's holdings in Libya.

"I don't understand," he said to Stavenger's image, trying to look puzzled. "Why are you telling me about this?"

"The security office has initiated a search for her throughout Selene. I'd appreciate it if you allowed them to search

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your premises, as well."

"My home?"

"It's just a formality, Mr. Humphries," Stavenger said, with an obviously false smile. "You know security types: they want to dot every eye and cross every tee."

"Yes, I suppose they do," Humphries replied, smiling back. "I suppose someone could hide out in the gardens, couldn't they?"

"Or inside the house. It's rather large."

"H'mm, yes, I suppose it is—by Selene standards." He took a breath, then said reluctantly, "Very well, let them send a team down here. I have no objections."

"Thank you, sir."

"You're welcome," said Humphries. He snapped his fingers to shut down the connection. Then he went into the house, walking swiftly to his office.

He snapped his fingers as he entered the office. The phone screen lit up. "Get Blyleven down here on the double. I've got a job for him."

MARE NUBIUM

The tractor plodded slowly along the bleak, empty expanse of *Mare Nubium*, heading away from the ringwall mountains that marked Alphonsus and the site of Selene.

Kris Cardenas fought to keep the terror from overcoming her. She could feel it, trembling deep inside her, crawling up into her throat, making her heart race so hard she could hear its pulse thundering in her ears.

"Where are you taking me?" she asked, her voice muffled by the helmet of the spacesuit they had put her into.

No response from the driver. Of course, Cardenas thought. They've disabled my suit's radio. A neat, high-tech way of gagging me.

The two goons who had picked her up the night before had brought her down to Humphries' extravagant place, in Selene's lowest level. Martin Humphries had not deigned to meet her, but she knew whose place it was. The servants had been very polite, offering her food and drink and showing her to a comfortable guest suite where she'd spent the night. The door to the corridor had been locked, of course. She was a prisoner and she knew it, no matter how sumptuous her cell.

Strangely, she slept well. But thinking over the situation the next morning, after a maid had brought a breakfast tray into her sitting room, Cardenas reasoned that Humphries was going to murder her. He'll have to, she thought. He can't let me go and let me tell everyone that he's killed Dan Randolph.

With my help, she added silently. I'm an accomplice to murder. A blind, stupid, stubborn fool who didn't see what she didn't want to see. Not until it was too late.

And now I'm going to be murdered, too. Why else would they be taking me all the way out into the godforsaken wilderness?

The thought of being killed frightened her, intellectually, in the front lobe of her brain. But being outside on the surface of the Moon, out in the deadly vacuum with all the radiation sleeting in from deep space, out here where humans were never meant to be—that terrified her deep in her guts. This tired little tractor had no pressurized cabin, no crew module; you had to be in a spacesuit to survive for a minute out here.

This a dead world, she thought as she looked through her helmet visor. The gray ground was absolutely dead, except for the cleated trails of other tractors that had come this way. No wind or weather would disturb those prints; they would remain in place until the Moon crumbled. Behind them, a lazy rooster tail of dust floated in the soft lunar gravity.

And beyond that, nothing but the gently undulating plain of barren rock, pockmarked with craters, some the size of finger-pokes, some big enough to swallow the tractor. Rocks strewn every-

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where, like the playroom toys of careless children.

The horizon was too close. It made Cardenas feel even jumpier. It felt wrong, dangerous. In the airless vacuum there was no haze, no softening with distance. That abrupt horizon slashed across her field of view like the edge of a cliff.

She saw that the ringwall mountains of Alphonsus were almost below the horizon behind them.

"Where are we going?" she asked again, knowing it was useless.

Beside her, Frank Blyleven was no longer smiling. He sweated inside his spacesuit as he drove the tractor. When he'd made his deal with Martin Humphries, it had been for nothing more serious than allowing Humphries to tap into Astro Corporation's communications net. A good chunk of money for practically no risk. Now he was ferrying a kidnapped woman, a Nobel scientist, for the lord's sweet sake! Humphries was going to have to pay extra for this.

Blyleven had to admit, though, that Humphries had smarts. Stavenger wants to search for Dr. Cardenas? OK. Who better to spirit her out of Selene for a while than the head of Astro's security department? Nobody asked any questions when he showed up at the garage already suited up, with another spacesuited person alongside him.

"Got to inspect the communications antennas out on Nubium," he told the guard checking out the tractors. "We'll be out about six hours."

Sure enough, three hours into his aimless wandering across the desolate *mare*, he got a radio signal from Humphries' people. "OK, bring her back."

Smiling again, he leaned his helmet against Cardenas' so she could hear him through sound conduction.

"We're going back now," he said. "They'll have a team to meet you. You behave yourself when we get to the garage."

Kris Cardenas felt a huge surge of gratitude well up inside her. We're going back. We'll be safe once we're back inside.

Then she realized that she was still Humphries' prisoner, and she wasn't really safe at all.

Dan felt simmering anger as he watched George's report on the wallscreen of the ship's wardroom.

"I was in on th' search of Humphries' place. It's big enough to hide a dozen people. We din't find Dr. Cardenas or any trace of her," George ended morosely.

"She must still be alive, then," Dan said. Then he blew out an impatient huff of breath as he realized that George wouldn't hear his words for another twenty minutes or so.

Pancho was sitting beside him in the wardroom, looking more puzzled than worried as George's image faded from the wallscreen.

"If they haven't found her body," Dan said to her, "it means she's probably still alive."

"Or they've stashed the corpse outside," Pancho suggested.

Dan nodded glumly.

"Why would Humphries want to kill Dr. Cardenas?" Pancho asked.

"Because she found out something that she wanted to tell me; something that Humphries doesn't want me to know."

"What?"

"How should I know?" Dan snapped.

Pancho grinned lamely. "Yeah, I guess that was a pretty dumb question."

Dan rubbed his chin, muttering, "Humphries knew the security people were coming to search his place so he just moved her somewhere else until the search was over. I'll bet a ton of diamonds she's back inside his house now. He'll want to keep her close."

"Prob'ly,' Pancho agreed.

"I wish there was a way we could get somebody into Humphries' place with-

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out him knowing it," Dan mused.

Pancho sat up straighter. "There is," she said, with a sly smile.

George counted it as a sign of Doug Stavenger's respect for Dr. Cardenas that he agreed to a private meeting.

"Invisible?" Stavenger looked shocked. "A cloak of invisibility?"

"I know it sounds nutty," George said, "but Dan told me that—"

"It's not nutty," Stavenger murmured, steepling his fingers before his face. "I'm stunned, though, that Ike Walton told anyone about it."

"You mean it's real? A cloak of invisibility?"

Stavenger eyed the big Aussie from behind his desk. "It's real, all right. But I doubt that it comes in your size. We're going to have to put the loose-lipped Mr. Walton back to work."

The worst part about this, Dan fumed silently, is being so far apart that we can't talk in real time.

He had paced the length of the crew module several times, from the bridge where Pancho and Amanda chatted amiably while monitoring the ship's highly automated systems to the sensor bay at the far end of the passageway, where Fuchs was bent over the sample of superconducting wire.

George's last message had an almost fairy-tale quality to it. "Stavenger's got the guy who made the cloak enlarging it to fit me. He's over in th' nanotech lab now, doin' it. He says I'll be able to sneak into Humphries' place sometime tomorrow morning, if he doesn't run into any snags."

Rumpelstiltskin, Dan thought as he prowled along the passageway. No, he was the guy who spun straw into gold. Who had the cloak of invisibility?

Pancho, he answered himself. Of all the sneaky con artists in the solar system, she's the one who comes up with a cloak of invisibility. Well, chance favors the prepared mind, they say. Pancho was smart enough and fast enough to use what chance offered her.

He found himself at the sensor bay again. There wasn't room for a chair. Fuchs was standing, staring at the same display screen he'd been staring at the last time Dan had looked in at him.

"Anything interesting?" Dan asked him.

Fuchs stirred as if being awakened from a dream. But from the worried expression on his face, Dan thought it might have been a nightmare.

"What is it, Lars?"

"I've found what created the hot spot in this section of wire," Fuchs said, his voice grave, solemn.

"Good!" said Dan.

"Not good," Fuchs countered, shaking his head.

"What is it?"

Pointing to the curves traced across the display screen, Fuchs said, "The amount of copper in the wire is diminishing."

"Huh?"

"The wire is superconducting only if its composition remains constant."

"And it stays cooled down to liquid nitrogen temperature," Dan added.

"Yes, of course. But this length of wire . . . its copper content is diminishing."

"Diminishing? What do you mean?"

"Look at the curves!" Fuchs said, with some heat. Rapping his knuckles on the display screen he said, "In the past two hours, the copper content has gone down six percent."

Dan felt baffled. "How could—"

"As the copper content dwindles, the wire goes from a superconducting state to a normal state. It begins to heat up. The hot spot boils off some of the nitrogen coolant. The hot spot grows. It was only microscopic at first, but it eventually became large enough for the monitoring sensors to detect it."

Dan stared at him.

"There is only one agency that I can think of that could selectively remove copper atoms from the wire."

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"Nanomachines?" Dan squeaked.

Fuchs nodded solemnly. "This length of wire was seeded with nanomachines that remove copper atoms and release them into the liquid nitrogen coolant. Even now they are removing copper atoms and letting them flow into the air of this compartment."

"Jesus H. Christ on a bicycle," Dan said, his insides suddenly hollow. "That's why Humphries grabbed Cardenas. She's the nanotech expert."

"We are infected," Fuchs said.

"But you caught it in time," Dan countered. "It's only this one length of wire that's infected."

"I hope so," Fuchs said. "Otherwise, we're all dead."

HUMPHRIES TRUST RESEARCH CENTER

George stood to one side of the walkway leading into Humphries' house. It had been eerie, riding down the escalators wearing the enlarged stealth suit that Ike Walton had cobbled together for him. George couldn't see his own feet. At one point, he nearly tripped and tumbled down a flight of escalator stairs.

Walton had looked like a naughty little kid caught peeking at dirty pictures when Stavenger had confronted him in his office and ordered him to enlarge the stealth suit to fit George.

Red-faced, Walton had stammered that he'd need help from the nanolab technicians, and that would ruin the secrecy that had shrouded the stealth suit since he'd first invented it.

"That can't be helped," Stavenger had replied tightly. "Secrecy's already been breached."

In the end, Stavenger himself went with Walton and George to the nanolab and asked the chief technician to clear out the lab and work with Walton by herself. In total secrecy. Once she understood that Dr. Cardenas' life might be at stake, she quickly agreed.

"I'd heard rumors about a stealth suit, off and on," she marvelled, once Walton explained what was needed.

"Don't add to them," Stavenger pleaded.

Walton had the programs for the nanomachines buried in his personal files. Within hours, he and the chief technician were watching a spread of darkly-glittering stealth cloth growing on a lab table. George stood slightly behind them, eyes goggling as the invisible virus-sized machines busily turned bins of metal shavings into his new suit.

Now he stood at the entrance to Humphries' house at high noon, trying to figure out a way to get through the front door without being detected. The huge cavern was in its daylight mode, long strips of full-spectrum lamps shining brightly. Wondering if the people inside the house came out for lunch, George edged closer to the door.

It swung open, surprising him, and a pair of Humphries' research scientists came out, deep in earnest conversation. George knew they were scientists from their costumes: the guy wore a shapeless open-necked shirt and faded jeans; he had a long ponytail down his back, as well; the woman was in a light sweater and loose, comfortable slacks. They were talking about the life cycle of some Latin-named species.

George slipped behind them as the door started to close and held it halfway open with one extended arm. The two scientists went on their way, chattering intently. George pushed the door open a little more and peered inside. Two hefty men in blue security uniforms stood inside, looking bored. George slipped through the door and then let it swing shut. The two guards never noticed. They were talking about last night's football tournament, videoed live from Barcelona.

An older man in a dark suit came out of a doorway halfway down the hall. He had the frozen-faced expression of a trained butler. George tiptoed past the guards, peeking into each open doorway as he went. He could hear voices

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from his left, and found a doorway that opened onto a long corridor, with plenty of people shuttling from one office to another along its length. That must be where the research staff works, he thought. Don't they break for lunch?

It was difficult to pick up odors from inside the suit's face mask, but George caught the unmistakable scent of steaks on the griddle, something he hadn't smelled since he'd been on Earth. Steaks! he thought. Humphries doesn't mind spendin' his fookin' money on hauling steaks up here.

The hallway ended in a busy, stainless-steel kitchen big enough to keep a good-sized restaurant going. The staff eats in, George realized. At least they do for lunch. Cooks and assistants were scurrying back and forth, pots were boiling steam, and an industrial-sized grill was sizzling with thick steaks. George counted eleven of them. A banker's dozen, he said to himself.

One of the dark-uniformed maids was putting together a much more modest meal on a large teak tray: a crisp salad, a small sandwich, a slice of melon and a pot of tea. A woman's lunch, George thought.

He followed the maid as she carried the tray past him, down the hallway, and up the stairs to the second floor. One of the doors along the upstairs hall was guarded by a bored-looking young man in a gray business suit. He saw the maid approaching and opened the bedroom door.

"Lunch is here, Dr. Cardenas," he said.

George stopped as the maid went through the bedroom door and came out again less than a minute later, the tray empty at her side. She closed the door. George heard the lock click. The guard gave her a smile and she smiled back, but neither of them said anything as she headed back for the stairs.

George leaned against the wall a half-dozen meters from the lethargic guard, who sat on a wooden chair and pulled a palmcomp from inside his jacket. From the beeps and peeps, George figured the guy was playing a game to pass the time.

OK, George said, folding his arms across his chest. Cardenas is in there. She's still alive. Now how do I get her out—alive?

He spent the better part of an hour prowling along the upstairs hall, checking out the stairway, studying the lone guard. Humphries apparently insisted on a dress code for his servants, George figured. The guards wore suits; the maid and the kitchen help wore uniforms. The scientists stayed on the other side of the house. They'd be no problem, George decided.

The maid returned with the empty tray, went into Cardenas' room, and came out with the lunch dishes. George thought Cardenas might be on a hunger strike; she had hardly eaten anything.

Shortly afterward, Humphries himself came up the hall. He was dressed casually: a white velour pullover and navy blue well-creased slacks. The guard snapped to his feet and stuffed his still-beeping palmcomp into his side pocket. Humphries frowned at him and motioned impatiently for him to open the door.

The door's kept locked, George realized, as Humphries stepped into the room. He waited until the door was almost shut, then tiptoed to it and pushed it slowly open. The guard paid no attention, engrossed once more in his video game. George let the door swing halfway open, then deftly slipped into the room.

Humphries noticed it. Frowning, he marched to the door and snapped at the guard, "Can't you close a goddamned door properly?" Then he slammed it shut.

Suppressing a chuckle, George edged into a corner of the room. Dr. Cardenas was standing tensely by the only window. It was a super room, George thought: big pieces of furniture made from real wood. Hauling it up to Selene must have cost more than the whole

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kitchen staff's salaries for ten years.

"How do you feel today?" Humphries asked Cardenas, crossing the oriental carpet toward her.

"I want to go home," she said flatly, as if it were a request that they both knew would be ignored.

Sure enough, Humphries acted as if he hadn't heard her. "I'm sorry that we had to take you outside. I understand that you don't like that."

"I want to go home," Cardenas repeated, stronger. "You can't keep me locked up here forever."

"I have a proposition to offer you. If you agree to it, you could go back to Earth and be with your grandchildren."

She closed her eyes wearily. "I simply want to go back to my quarters here at Selene. Let me go. Now."

Humphries sighed dramatically and sat on the upholstered chair near the window. "I'm afraid that's impossible, at this precise moment. Surely you can understand why."

"I won't say a word to anyone," Cardenas replied, walking uncertainly toward the sofa that faced his chair. "I simply want to return to my normal life."

"Without warning Randolph?"

"It's too late to warn Dan by now," she said. "You know that."

Humphries spread his hands. "Really, the best option for you is to return to Earth. You'll be in very comfortable quarters and I'll personally guarantee that your daughters and grandchildren will be brought to you."

"The way I was brought here?"

"You haven't been harmed, have you? You've been treated with great care."

"I'm still a prisoner."

It seemed to George that Humphries was working hard to control his temper. "But if you'll only do what I ask," he said, tightly, "you can return to Earth and be with your family. What more could you ask for?"

"I don't *want* to go to Earth!" Cardenas burst. "I won't be a part of your scheme!"

"You haven't even heard what my . . . scheme, as you put it, is."

"I don't care. I don't want to hear it."

"But it will stop the greenhouse warming. It will save the Earth."

"Nothing can save the Earth and you know it."

He hung his head for a moment, as if trying to find the right words. At last he looked up at her again. "You can save the Earth, Dr. Cardenas. That's the real reason why I brought you here. I need you to run the operation. I need the absolute best person there is. That person is you. No one else could make it work."

"Whatever it is, I won't do it," Cardenas said flatly.

"Not even to save the Earth?"

She gave him a withering look. "What makes you think I want to save the Earth?"

"Not even to save your grandchildren?" He said it with a smile.

Cardenas gasped when she realized what he meant. "You're threatening my family?"

He put on an innocent air. "Did I make a threat?"

"You're despicable!"

Humphries slowly got to his feet, like a man weary of dealing with an obstinate child. "Dr. Cardenas," he said slowly, "your options are few. Please hear me out."

"I won't say a word to anyone."

"I'm not talking about that now."

She started to reply, then thought better of it.

"At least listen to what I have to say."

She stared at him.

"Think of your grandchildren back there on Earth," Humphries coaxed. "Their future is in your hands."

Still without saying a word, Cardenas slowly sat on the sofa, facing Humphries.

"That's better," he said, smiling. "We're both reasonable people, I'm sure we can work this out."

George walked softly toward them, listening intently. ■

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THE REFERENCE LIBRARY Tom Easton

Metaplanetary, Tony Daniel, Harper, $25, 437 pp. (ISBN: 0-06-105142-X).

They Also Serve, Mike Moscoe, Ace, $6.50, 357 pp. (ISBN: 0-441-00795-3).

Borrowed Tides, Paul Levinson, TOR, $22.95, 238 pp. (ISBN: 0-312-84869-2).

The Wooden Sea, Jonathan Carroll, TOR, $23.95, 302 pp. (ISBN: 0-312-87823-0).

The Spike: How Our Lives Are Being Transformed by Rapidly Advancing Technologies, Damien Broderick, TOR, $24.95, 384 pp. (ISBN: 0-312-87781-1).

The Octagonal Raven, L. E. Modesitt, Jr., TOR, $27.95, 398 pp. (ISBN: 0-312-87720-X).

Foreign Bodies, Stephen Dedman, TOR, $14.95, 287 pp. (ISBN: 0-312-87259-3).

The Art of Rowena, text by Doris Vallejo, Paper Tiger (distributed by Sterling Pub lishing Co., 387 Park Avenue South, New York, NY 10016-8810), $29.95, 112 pp. (ISBN: 1-85585-778-2).

The Branch, Mike Resnick, Wildside, $15.95, 173 pp. (ISBN: 1-58715-163-4).

Nanotechnology seems to be becoming a greater and greater presence in science fiction. Three of this month's novels deal with it, and there have been others in recent columns.

Is the fuss justified? Are eentsy-weentsy teeny-tiny machines really going to solve all conceivable resource shortages and give everyone access to all the consumer goodies they can dream of?

That's the hype, as Damien Broderick pitches it in his book (see below), and people are definitely working in this area. Indeed, the 24 November 2000 *Science* had a special section on "Issues In Nanotechnology." But it seems that atoms are "sticky" enough to resist doing what we want them to. This means that the famous nano-gears and nano-motors don't really work very well (see the July 22, 2000, *Science News*) and atomic-level assembly of macroscopic objects may truly not be feasible.

But what the heck. Science fiction likes to pretend that its present dreams are future reality but it never allows feasibility to get in the way of a good story. And nanotechnology has huge potential there!

For example, look at Tony Daniel's **Metaplanetary**. Nanotech has made it possible to link the planets of the solar system all the way out to the Belt with a network of hollow tubes, the Met. Travel is easy and many billions live in the tubes and the swellings that mark their intersections, as well as on all the smaller planets and their moons. People live beyond the Belt, too, on the moons of Jupiter, Saturn, Neptune, Uranus, Pluto, Charon, and on beyond, where the vast Cloudships rule the Oort Cloud and venture into the deeps beyond. Thanks to nanotech, people are even adapted to vacuum, cold, heat, toxic atmospheres, and more.

There is intelligent software as well, and people are routinely expanded to have both an "aspect" portion (the meat) and a "convert" portion (AI). "Free converts" are converts that are no longer associated with aspects, as well as sentient software that never had anything to do with aspects. LAPs are people writ large—arrays of aspects (perhaps clones) and converts that spread a single intelligence across vast spaces (it helps that communication is superluminal); the Cloudships are examples, but

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so are scientists and artists, including the composer Amés who has become a dominant political figure. Wild software has moved into the bodies of rats and other critters or made bodies of its own from the ubiquitous "grist," the layer of nanotech units that pervades the human-made world.

But all is not well. Amés is trying to bring all of humanity under his sway, to play the species like a piano. There are rumors of war, and the economy is trembling. Kelly Graytor, a Mercurian financier, gathers his free-convert wife and his hybrid children and tries to flee to the outer system, but the forces of tyranny are moving fast. His wife is captured, stripped of her citizen rights, and incarcerated in a camp where she is allowed to be no more than a glorified calculator, even as a classic Mad Scientist plays with her precious memories. His daughter Aubry falls in with the strange folks of the Resistance and manages to stay free, while Amés's forces strike at the outer worlds, even as those worlds are mustering their strength. The Cloudships are debating what to do. And the war has only begun.

Daniel has created a world so fascinating that the reader very easily suspends all disbelief in the putative technologies that underpin it. Here is politics in a familiar vein, willing to destroy billions in pursuit of The Cause. There are people whose pain and joy and dedication transcend their nature as aspect or convert or expanded combination. There is action and derring-do and heroism. In short, there is everything any SF fan needs to keep him or her ensconced in a recliner for many hours.

With luck, Daniel will keep it up for many years.

Colonel Ray Longknife won a war—though he was crippled by a blast from ex-miner Mary Rodrigo. Now he is minister for science and technology for the world of Wardhaven, his wife Rita has a baby on the way, Mary is his security chief, and he's on his way to an important meeting on another world. Unfortunately, when his ship enters the jump-point (built by long-vanished aliens), sabotage kicks in. He emerges a long, long way from home. Fortunately, his crew has managed to come back from a previous stranding; they know what to do, and while they do it, Longknife and the rest of his staff can go down to the local world, where the crew and passengers of the lost starship *Santa Maria* have had three centuries to build an idiosyncratic civilization.

This is the setting of Mike Moscoe's **They Also Serve**. It's got a nice set of characters, a nice jam for them to get out of, and it gets even nicer. The local world is metal-poor, and one family, the Sterlings, has a lock on both money and power thanks to having established a monopoly on mining back when. And Longknife's folks know mining (remember Mary?)—they use nanotech burrowers to extract metal from a landscape without digging unsightly holes.

Meanwhile, a batch of local kids have found a box. They pry it open, flip a switch, and that mountain over yonder disappears. This puts the wind up both the local power structure and the new arrivals. Also meanwhile, a character he calls the Gardener has showed up in Longknife's dreams, a tumor is growing in his head, and his crippling injuries seem to be healing. And then—Mary's crew mines a hill, the Gardener goes silent, a new crop of dream figures shows up in a very bad mood, and the locals start going berserk.

What's going on? Ancient aliens, of course. They apparently turned the planet into a single solid-state device, a vast artificial intelligence dedicated to educating their young. Then they went away, and for a million years the machine lay idle. When humans arrived, it began to awaken once more. But its parts are divided; most are snotty, claiming that they know everything (except of course where their makers went and

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why), and hostile to boot. Only a few are willing to consider humans as potential allies, and now the war is on, AIs against AIs, with humans in the middle.

But human activities can damage the machine, destroying circuitry. If the mountain-blaster can just be found, humans can even settle the war. But the Sterlings, who want to destroy Longknife and his people, and their local opponents are after the gizmo too.

Who wins? There can be no doubt. Getting there is all the fun, and Moscoe does a nice job of it.

GRUMP ALERT: I hope, however, that between the "uncorrected proof" I had to read and the final copy, he or his copyeditor cleared up the persistent confusion of "disperse" and "disburse" (one does not "disburse" a squad across a landscape). Moscoe isn't alone in this error. I've seen it before, and it's understandable to a degree since the words sound much alike and since computer spellcheckers don't spot errors that are real words. But it grates on the soul of any literate reader.

Paul Levinson grates even worse with **Borrowed Tides**. In fact, the reader can be pardoned for pitching the book across the room within half a dozen pages of the start.

What's the problem? Picture the very first starship. It's just about done, way out by Mars. Unfortunately, it can't carry enough fuel to come home again. If you want to go to Alpha Centauri, it's a one-way trip. Therefore, only robots can go, right?

Well . . . The designers put in a life-support system anyway, just for verisimilitude. And then a childhood friend of project chief Aaron Schoenfeld shows up. He's Jack Lumet, nuts for Indians, and he has a tale from Iroquois lore of a shaman who about 1500 AD equated the currents in the Hudson river with flows in space between Earth and Alpha Centauri. All you need is enough fuel for a one-way trip; then the reverse current takes you home for free. And supposedly the shaman took the trip.

Well, OK. Science fiction has gone out on weaker limbs than free-ride space currents before.

BUT . . . Alpha Centauri is not visible north of latitude 25 degrees—just about the southern tip of Florida. The Iroquois lived well north of that.

Precession of the Earth's axis shifted Alpha Centauri far enough north in the sky to be visible to the ancient Greeks, who named the Centaur constellation. But that was 2000 years ago, long before anything resembling the Iroquois tribe could exist.

Within a few pages, Levinson does give these factors a nod, saying perhaps the Iroquois heard about Alpha Centauri from the Seminoles. But the Seminoles didn't exist that early—they were created by the displacement of more northerly Native American groups by European settlers.

So. Levinson has done the SFnal equivalent of claiming that Massachusetts is situated on the Mediterranean coast and peopled by Ainu. If you manage to stay with the story anyway, it doesn't get much better. His star travelers get to Alpha C, and as they arrive the star emits a cloud of gaseous hydrogen and oxygen. A Mars-type planet turns green and welcoming. The laws of momentum are suspended. The fuel tank starts to fill up again. The clock runs backward (though the characters have no trouble with memory). Reality's mainspring has clearly broken, and in the end it is clear that if any ancient shaman had ever ridden the star currents, there was no way he could have told anyone about the experience.

TOR's blurb writer says that Levinson is "extending his reach into Philip K. Dick territory." Unfortunately, Dick always made more sense.

Jonathan Carroll is a strange fellow, judging from his latest offbeat fantasy, **The Wooden Sea**. The protagonist is

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Frannie McCabe, the police chief of Crane's View. He seems a pretty sensible fellow, down to earth, twice married, doing the best he can. But then someone finds a one-eyed, three-legged dog asleep in a parking lot and brings it to the station. "Old Vertue"—according to the tag on its collar—soon expires, and Frannie goes off into the woods to dig a hole and bury the body. As a grave-gift, he leaves a colorful feather that was all that remained after the Schiavos—a famously combative couple—mysteriously vanished.

And then Old Vertue reappears—feather and all—in the trunk of Frannie's car. A friend—so clear-thinking a fellow that he makes a decent living writing instruction manuals—discovers a 300-year-old portrait of Old Vertue in an art book. Frannie's stepdaughter gets tattooed with a picture of the mysterious feather. A version of himself from another age of life shows up with advice and a leer for the stepdaughter—who quite disconcertingly leers right back. A high school girl OD's and the feather is in her clothing.

What the heck is going on? Poor, bewildered Frannie hasn't a clue. Time-travel seems to be involved. Strange figures not of this Earth. Mysterious missions upon which hangs the fate of the Universe. A driving need to figure out how to row a boat on a wooden sea.

Huh? No, it doesn't make a whole lot of sense. But Carroll brings it alive much more successfully than Levinson; the reader never loses her grip on this particular horse as it gallops off in search of past and future and destiny, and in the end, she is even ready for another ride in the sequel that is hinted.

Damien Broderick's **The Spike: How Our Lives Are Being Transformed by Rapidly Advancing Technologies** is a techno-optimistic tract. Its meat is Vernor Vinge's "singularity," that moment when the curve of technological progress goes vertical and we lose all our ability to imagine the future—even the future of next week! The technologies in question are computers, artificial intelligence, and mental uploads (*vide* Hans Moravec's *Robot: Mere Machine to Transcendent Mind*, reviewed here in April 1999) and nanotechnology and matter replication (*vide* Eric Drexler *et al.*). These are things that have turned up in this magazine—as both fact articles and stories—many times. They are utterly enchanting prospects to us, and I am sure that many of you will find this book fascinating. Certainly Broderick has the gift of exposition as he reviews the prospects, outlining the basics of exponential growth, nanotech, AI, and more, reporting the laboratory results that hint at vaster things to come, quoting science fiction writers (not all of whom are also scientists like Vinge), stressing to his own obvious delight some of the most outlandish schemes for restructuring bodies, minds, and planets, and assuring us that the Vingean singularity is almost upon us—it will arrive no later than 2050, and perhaps as early as 2010.

Broderick does try to balance the enthusiasm with some recognition that there are skeptics and that there are reasons to be skeptical, but he is still distinctly breathless. "Progress!" he pants. "It's on an exponential rise! Tomorrow will be strange! Marvelous! Unpredictable! Wow!!"

And perhaps he's right. But he damages the reader's trust in his judgment when he makes simple mathematical mistakes, such as calling an S-shaped curve's "point of inflection" "the place where the convex part [of the curve] runs out of puff and starts to trail away." The "inflection point" (properly so-called) is actually the middle of the vertical rise (the very beginning of the convex part), where the curve stops getting ever steeper and starts to become ever less steep.

L. E. Modesitt, Jr. has a more restrained view of the future. Yes, there will be artificial intelligence and nan-

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otechnology, and the latter in particular will create economic chaos that will help to bring down the civilization we know. But life will remain quite recognizable.

The Octagonal Raven is set centuries after the collapse of our current political and economic structure. Place names are different (though many seem kin to ones we know). Personal names have mutated to Myrto, Klevyl, Gerrat, Eldyn, and the like. Classes remain, with the "pre-selects"—selected in the womb for desirable gene combinations, apparently also genetically adjusted, and equipped with internal nanotech systems to protect health and augment intelligence and strength—on top of the heap. The "norms"—with nanotech health protection but lacking the other advantages—suffer a shortage of access to high-end education and jobs. Not surprisingly, they're a bit resentful.

Daryn Alwyn is the scion of a media family. Papa is the chief honcho of UniComm, the leading communications net. Brother Gerrat is the heir apparent. Sister Elora is a major player on a competing team. Daryn spent years in the Federal Service space fleet—where he was among the first to find the inactive octagonal spacegates constructed by some ancient people—before coming home to become a freelance multimedia essayist and media consultant. And he's doing fine—until one evening, at a cousin's party, an attractive woman apparently tries to kill him. Further attempts follow, all marked by untraceability and clear signs that huge resources are behind them. Then his sister is killed, he inherits her stock, and he is suddenly in the middle of a war whose stakes are not entirely clear but do seem centered on control of society, on further oppression of the norms and even those pre-selects who are not properly connected.

What can he do? And what are the octagonal nanites in his system? As usual, Modesitt does an exceptional job of painting an environmentally informed society, plotting an exciting yarn, assembling an interesting cast, and leading it all in an interesting direction. I recommend this one heartily.

How likely is Modesitt's future, compared to Broderick's? We can hardly say. Broderick would assure us that his "spike" or Vinge's "singularity" will be followed by massive changes and that Modesitt's vision is far too tame. Perhaps Modesitt would riposte that that doesn't lend itself very well to believable story, and he would surely be right. Personally, I suspect that Broderick is overstating the prospects of change, even though I am aware that one rule of thumb usually neglected by both SF writers and futurists is that projections almost always turn out to fall far short of the reality.

Stephen Dedman's **Foreign Bodies** is a nicely gritty rendition of a time-travel classic. Not too far in our future, the streets of San Francisco are thronged with homeless refugees or strippers, products of rising sea level and ruthless economies. Mike Galloway sells airline tickets and has a nice little apartment whose balcony is occupied by a stripper waif named Swiftie. He knows better than to let her in, but he can't resist passing her old clothes and other goodies. He even helps her write and sell a science fiction yarn about a thoroughly desperate future that can send folks into the past by sending their minds or brain-tapes into the skulls of people who have just flat-lined. The check clears, Swiftie spends it on a bag full of electronic gizmos, and suddenly Mike is in her body.

Clearly, Swiftie's yarn wasn't fiction. Just as clearly, she had a mission. But Mike hasn't a clue what that mission might be until the white supremacists start turning up the volume, massacring nonwhites, and predicting catastrophe. Is Swiftie out to make the world safe for Nazis? What a horrible thought, and Mike—now known as Lee—is going to do everything he/she can to stop it. Fortunately, she has talents and is good at

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gaining allies right up to the apocalyptic finale.

The publisher Paper Tiger has for years been assembling the work of notable artists into displays well worth the attention of all lovers of SF&F art. Now, in **The Art of Rowena**, it is the turn of Rowena Morrill, a lush and sensuous artist of the fantastic with an unusual gift for texture, whether of the human form or of seawater shattering like glass as a sea monster pokes out its head to inspect a sunbather. Her work—book covers, calendars, games, and portraits—is accompanied by an appreciative foreword by renowned artists Greg and Tim Hildebrandt and a biographical essay by Doris Vallejo. There are also several examples of Rowena's work as a composer—music, says Vallejo, was in fact her first love.

Her best work is surely in the section of "personal paintings," where she shows what she can do when she is not constrained by the imaginations of authors and art directors.

NOTABLE REISSUES

Mike Resnick's **The Branch** is once more available and well worth attention. When it first came out almost 20 years ago (I reviewed it here in June 1984), I said that it does a marvelous job of goring sacred oxen as it presents the prosperously bored world of Jeremiah the B, a ne'er-do-well bum of low moral character whom a gangster chieftain cannot seem to kill—bullets miss and gadgets jam. Why? Jeremiah the B is the last scion of the tree of David, childless, and vasectomized. Therefore, he has to be the Messiah, destined to establish a Jewish kingdom in Jerusalem. Of *course* he can't be killed!

In his afterword, Resnick tells us of the Andorran film producer who turned the book into an award-winning movie and as a reward for his sacrilege was told he would not be allowed to work in his own country for fifteen years—a story almost as good as the novel!

If you missed it before, don't now. ■

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BRASS TACKS

Dear Dr. Schmidt,

Just finished reading the Feb. 2001 issue. "The Mycojuana Incident" and "The Fine Art of Watching" were both interesting and entertaining, although I felt "FAofW's" ending was a bit weak. "Or Die Trying" offered a clever twist on the detective story. However, Brian Plante's "Fresh Air" has my vote for best story of the issue—as a 36-year-old mother of three, maybe I'm just a pushover for sentimentality, but I felt this was an excellent depiction of the longing such a situation would engender in a parent. I found "The View from Space" to be informative and enlightening, and thoroughly enjoyed my subsequent visits to the web sites referenced by the author. One quick note: In UPCOMING EVENTS, the World Fantasy Convention for 2001 is incorrectly advertised. The information given is for last year's event. This year's convention is being held in Montreal, Canada, Nov. 1–4. Thank you for a great read, cover-to-cover. Keep up the good work!

Catherine A. Adams

Dear Stan,

I think I love you! I have thought I was imagining the amount of overwork that my daughters have had in homework and projects over major breaks! Thank you, thank you for validating my point of view in your editorial!

May I please copy that "Child's Play II" editorial to send copies to the School Board and my children's teachers and principals? I'd like to blanket the District with them!

Sylvia Fellows

Dear Dr. Schmidt,

Normally, your editorial is the first thing I turn to when a new issue arrives, but for some reason, this month (Feb., 2001 "Child's Play II") I waited. When I did, I wanted to cheer out loud. You are so correct. Our children's time is becoming more and more structured, micromanaged like a junior version of an adult career, with play time seen by all too many as something to be eliminated in favor of more "productive" activities. As a reader, a writer of children's stories, and more importantly, as a parent, I applaud you. By instituting required reading lists we are turning what should be one of the most joyful activities, reading, into simply another dull task to be met before free time may be allowed.

Children need time to play, to explore on their own terms, to kindle the interests they will carry for the rest of their lives. When we impose too much over their freedom we steal more than just a few hours of play: we steal from them their ability to daydream and create. In short, we rob them of imagination, the very wellspring of all art, science and literature. We rob them of their childhoods.

I wish your editorial was required reading for every librarian, schoolboard and school administrator across the country. That would be one reading list I would heartily endorse.

Justin Stanchfield

Dear Dr. Schmidt,

You really hit the nail on the head in differentiating the significances of work and play. (Child's Play II, Feb. 2001) It brought to mind several analogies, or

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contrasts, between the schoolroom and the workplace. Being a student *is* a job, not an excuse for loafing! This doesn't sink in right away at the grade school level. From my own early school days, (1930's) I can recall my classmates complaint, " I hate math—It's *hard*!" Well, TANSTAAFL! Even at the university level (40's - 50's) some of my classmates hadn't yet gotten the message. Sooner or later, everybody works for a living, in one way or another, and learning this is part of an education. For some, work is easy. For a lucky few of us, work is fun, what we'd do if we didn't have to "work" for a living. For most, work is hard, what you do so you have the resources to do what you really want to do on your non-work time. A good education helps you find your way into Categories 1 or 2 above, and avoid Category 3.

Our society has generally adopted a forty-hour work week. To me that means that your job, on the average, should take about that amount of your time. Considering special factors like end-of-month bookkeeping, hot project deadlines, etc. it might take more or less *this* week. If your job regularly takes more than that, you're either under-qualified or working for a slave driver. If you often find yourself staring at the wall, you may be over-qualified, and certainly under-supervised! Either way, it's a management problem. Depending on the grade level, we seem to have some sort of time standards for class (and homework) time too. Again, the time required should, as you point out, be enough that break-time and vacation assignments aren't necessary. If that isn't so, again it's a management (i.e. teacher/curriculum) problem.

A caution, however. We seem to have a problem with the setting of those class and homework standards. Too often it appears that they have been set so that everybody "succeeds," nobody is humiliated, and the school system looks good. Our education establishment needs to take a hard look at the standards in industrial Europe and Asia, and at the standards that once applied here in the USA. Also, we need to look at the kind of motivations we provide. I had classmates that were physically beaten for poor grades! Others were rewarded with money bonuses for good ones. Sometimes there were public awards and recognitions for top performers. Does anyone remember the dunce cap? All of these seem to have fallen into ill repute, but what has replaced them? We certainly need higher standards and expectations in education, so we need comparably strong motivations. In the workplace, the motivation is, generally, "If you don't produce, you're fired!" We don't want to "fire" a student, but there needs to be some immediate and personally unpleasant consequences for the student who fails to deliver his conscientiously best effort.

It's a lot easier to criticize than it is to come up with workable solutions, I know. I truly respect the many dedicated teachers/educators who accomplish the seemingly impossible task of enlightening apparently recalcitrant pupils. More power to them. And keep up the pressure with the *Analog* editorials. Teachers are SciFi readers too!

R. Wimmer

Dear Stan,

Your editorial in the February issue was so right as to be scary. The adage, "All work and no play makes Jack a dull boy" is also appropriate. Not everyone is as fortunate as I was; when I read Hiram Maxim's book, *High Explosive* at the tender age of four, I knew I was going to be a chemist—specifically an explosives chemist. Of course, having gotten, by serendipitous means, onto the Manhattan Project as a chemist, I sort of figured that I couldn't top that, so—but the point is that I *knew* what my career was to be, and it was *play!*

That did not prevent me from playing the prevalent games that all the kids

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played then—and I wonder, how many children nowadays have ever *heard* of "Kick the Can" or "Blackman" or "Prisoner's Base" or "Alley Over" or "London Bridge?" How many even *know* "Counting Out" rhymes like "One Potato" or "Eenie Meeny"? (or why you needed a counting-out rhyme anyway) But you get the idea. Even the *games* nowadays aren't *fun!* When I was a kid, if we wanted to play baseball, we played baseball—of course, the ball was probably wrapped in friction tape, and somewhat lopsided, which made for interesting hops, and the bats were better left unmentioned, while the bases were usually ad hoc. Or maybe, if we didn't have enough kids for a scratch game, we'd play "Workups" or "One Old Cat" or "Keepaway," none of which I'll wager, are in the lexicon of modern youth. Little League? We would have avoided it like the plague; it would have been considered as an imposition by adults on our free time—which it would have been! (And *is!*) And if a teacher had the unmitigated *nerve* to "assign" a task for summer vacation, *none* of the kids would even have *looked* at it all summer long; some brown-nosers *might* have peeked at it the last week of vacation, but even they would not have it *done*—And the teacher didn't *expect* it! Summer tasks were assigned for the purpose of being ignored by the students in order to instill a proper sense of guilt in them when the teacher gave the peroration about how disappointed she (he) was. Somewhere in the modern rush to succeed in life, we totally forgot that children have a right to be children, and it's a shame, for which we are paying in the prevalence of such confections as ADD or ADHD, which, I believe, would not exist if the kids were allowed to be kids!

Yes—we lived, as children; modern kids are not allowed to, and that's too bad. Maybe that's why Columbine and others?

Edward G. Robles

Dear Mr. Kooistra,

I was intrigued by your assertion in the February Analog that: "[engineers] also get upset when they find out that Newton's third law is violated in classical E&M", and how you then proceeded to cite Feynman's Lectures to support this allegation.

I'll admit, having been an electrical engineer for about 50 years, I was startled (one could say "upset") by this news. Because I have long been taught that strict conservation of (something we call) momentum and energy is an unavoidable mathematical consequence of Maxwell's equations and special relativity.

So I procured a copy of Feynman's Lectures and looked up the references you cited (Vol II, pages 17-6 and 27-11).

As I understand and interpret Feynman's words, Mr. Feynman has said no such thing whatever! As a matter of fact, on page 27-11 Feynman writes, "However, the change of the particle momenta is just made up by the field momentum, so *the total momentum of particles plus field is conserved.*" (emphasis mine)

I'm very disappointed; I was hoping to learn something new and interesting about physics. But the reference you cited merely tends to confirm my own preexisting prejudice regarding the validity of classical EM theory and the associated conservation laws.

For the sake of completeness: I also studied the discussion in chapter 28. Contrary to your remark in "Aether One Or The Other," Feynman did not say that electrodynamics "isn't even self-consistent." He actually said, "The concepts of simple charged particles and the electromagnetic field are in some way inconsistent." This suggests to me that our theories are, rather, *incomplete*. i.e., electrons, etc. are something other than "simple charged particles." And as I think Feynman would agree, we have no way of even guessing what is the internal structure of an electron (or neutrino, muon, quark, etc.).

Ed Nichols

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Dear Dr. Schmidt,

I agree with Jeffery Kooistra (The Alternate View, Feb. 2001) that the Michelson-Morley experiment did not refute the existence of an aether. What it actually did was confirm the absence of an aether necessary to the transmission of light waves.

A wonderful popularization, *The Evolution of Physics*, by Albert Einstein and Leopold Infeld, p. 148-149, describes the creation and generation of an electromagnetic wave: essentially a changing magnetic field immediately produces a changing electric field which, in turn, produces another magnetic field, and this leapfrogging process continues ad infinitum into space in a steady wavelike progression. Nowhere in this dynamic can one discern the need for an extrinsic aether medium to "float" these "waves." The authors admit as much on page 153. "Our only way out seems to be to take for granted the fact that space has the physical property of transmitting electromagnetic waves, and not to bother too much about the meaning of this statement."

If electromagnetic energy is a sort of waving substance rather than a disturbance in a preexisting medium, the concept of the aether is rightly discarded, and so should be all of the aether theories of light. That would leave only the Theory of Special Relativity, but the M-M experiment should hardly be described as "inherently null" on that basis alone.

The SR theory was formulated about thirty years before Einstein's and Infeld's book. This was still a time when no one could conceive of waves that didn't need something to wave about in, and that something, that aether, did not allow the speed of wave to vary. The young Mr. Einstein had to weave this speed restriction into his SR theory, for it was essential to the nature of waves. While ostensibly ignoring the aether in SR, he, none the less, retained it implicitly. It is at least arguable that SR is a "stealth" aether theory, and that takes even more "nullness" out of "inherently null."

Mr. Kooistra might have mentioned that the null result of M-M could also be neatly explained by the long-discredited Ballistic Theory of light, especially if the aether concept is abandoned. I'm not going to go down this road any farther because I'm sure then this letter would never see print. Maybe Mr. Kooistra will take it from here.

Raymond Graudis

Dear Brass Tacks,

In the February 2000 issue, letter writer Gerald David Nordley stated, "I'll note that if you hold a steel or iron bar in rough alignment to the Earth's magnetic field and strike it (to loosen up the magnetic domains, I suppose) it will be magnetized in the opposite sense of the Earth's field and strongly enough to pick up filing dust or to move paper clips—much more intense than the Earth's magnetic field that caused the original magnetization." Just recently, I got around to trying the experiment, although I only used a paper clip and not filing dust, and I observed no magnetic properties at all.

When you think about Nordley's claim, doesn't it sound like New Age craziness? You can loosen up magnetic domains by striking an iron bar? It sounds far-fetched. I have become suspicious of writers who use terms like, "amazingly complicated" in reference to scientific matters as Jeffery D. Kooistra did in his reply to Nordley. The only complicated thing about science, as well as life in general, is being honest. Someone should have put Nordley's claims to a scientific test and reported the results.

I think we are coming out of an era of scientific idealism that has been responsible for much bad science and cults of personality (the lionization of Stephen Hawking). Now we are finally re-entering an era of scientific realism. Just do the experiment and tell the truth. No more, no less.

Jim Spinosa ■

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UPCOMING EVENTS Anthony Lewis

29 June–1 July 2001
CONSORTIUM (Houston area SF conference) at Radisson Hotel & Conference Center, Hobby Airport, Houston TX. Guest of Honor—David Weber; Fan Guests of Honor—Margaret Fincannon and Clif Davis; MC—Tony Elam. Registration—$25 until 31 May 2001, $30 thereafter. Info—ConSortium 2001, Private Mail Box 367, 3118 Farm 528 Rd, Webster TX 77598; email—info@consortium.org; URL—www.consortium.org

5–8 July 2001
WESTERCON 54 (West coast science-fantasy conference) at DoubleTree Hotel Jantzen Beach/DoubleTree Hotel Columbia River, Portland OR. Guest of Honor—Tim Powers; Artist Guest of Honor—Frank Lurz; Editor Guest of Honor—Terri Windling; Fan Guest of Honor—Mike Glyer. Locus Awards will be presented. Info—Westercon 54, Box 5901, Portland OR 97228-5901; phone—(360)993-2001; email—deaner@pacifier.com; URL—www.osfci.org/w2001

13–15 July 2001
READERCON 13 (Boston area literary-oriented SF conference) at Marriott, Burlington, MA. Guests of Honor—Michael Swanwick and David Hartwell; Memorial Guest of Honor—Clifford D. Simak. Registration—$35 until 30 June 2001, $45 at the door. Info—Readercon, Box 381246, Cambridge, MA 02138-1246; email—info@readercon.org; URL—www.readercon.org.

3–6 August 2001
MYTHCON 32 (mythopoeic conference) at Clark Kerr Campus, UC Berkeley, CA. Scholar Guest of Honor—David Llewellyn Dodds, Author Guest of Honor—Peter S. Beagle. Registration—$35 (Mythopoeic Society member), $45 (non-members) until 1 March 2001, more thereafter. Info—Mythcon 32, c/o Bonnie Rauscher, 1131 Tenth Street, Berkeley, CA 94710. email—bonnier@fpcberkeley.org. URL—www.mythsoc.org/mythcon32.

30 August–3 September 2001
MILLENNIUM PHILCON (59th World Science Fiction Convention) at Philadelphia Marriott, Philadelphia, PA. Guests of Honor—Greg Bear, Stephen Youll, Gardner Dozois, George Scithers, TM—Esther Friesner. Registration—$160 after 30 September 2000; supporting $40. [These are the latest rates posted on the Internet as of the time this column went to press.] This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info—Philcon, Box 310, Huntingdon Valley, PA 19006. email—philcon2001@netaxs.com URL—http://www.netaxs.com/~phil2001.

26–29 October 2001
WORLD FANTASY CONVENTION 28 at Montreal, Quebec. Registration—$90 until 15 October 2000 (latest information at press time). Info—2001 WFC, c/o Bruce Farr, 7002 North Sixth Avenue, Phoenix, AZ 85021, phone—(602)395-1945 email—brucex.farr@intel.com

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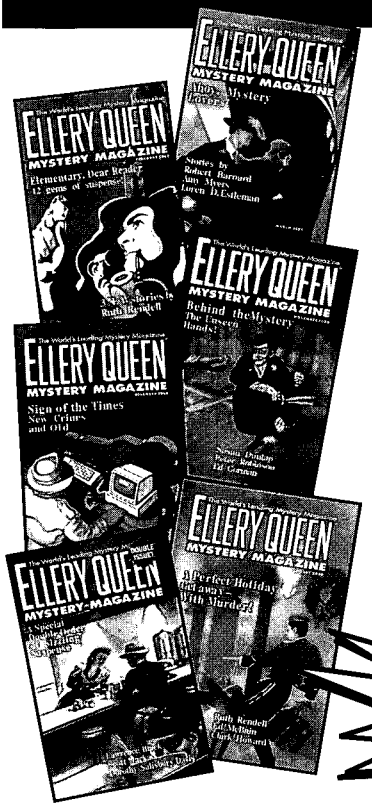

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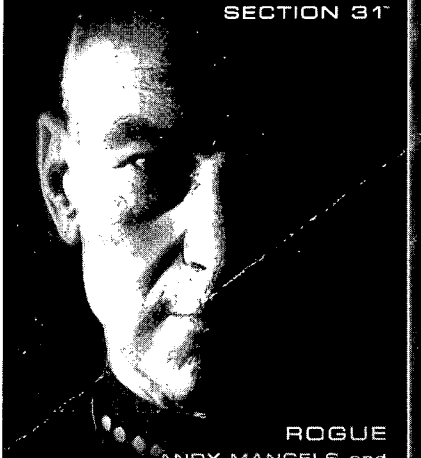

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